TELEPHONE ENGINEER

Volume XV CHICAGO, MAY, 1916

5766 Automatic Telephone

OF THE CITY'S ORDERS

have been placed by the Ohio State

Company as a

Automatic

Akron Washington, D.

York

Evansville

These Exchanges have been in service

of seven months

HOW EVERY DEPARTMENT OF THE

LARITY AUTOMATIC SERVICE

What the Automatic has done for others

It can do for you

Automatic Electric Company

CHICAGO

The Oshkosh Folding Take-up Reel

Save two men's work in taking down wire with this handy device which does away with throwing tangled wire on a wagon. Will coil wire to whatever size you desire. Weighs only forty-five pounds. Strongly constructed and durable. Frame folds up into a neat, compact bundle. Will pay for itself in a short time.

Oshkosh Reels—Light or Heavy

Oshkosh reels have gained an enviable reputation for durability. Light reels are built throughout of rock elm and heavily braced and reinforced with steel. The legs are of heavy steel and are bolted on to the barrow handle. The heavy reels are made of heavier material and are better braced, and reinforced with plate steel. Guaranteed against all defects. Guard pins for either light or heavy reels are adjustable for twelve, eighteen, twenty-one and twenty-four inch coils.

Send for the Oshkosh catalogue which describes complete line of construction tools for telegraph, telephone and railroad lines.

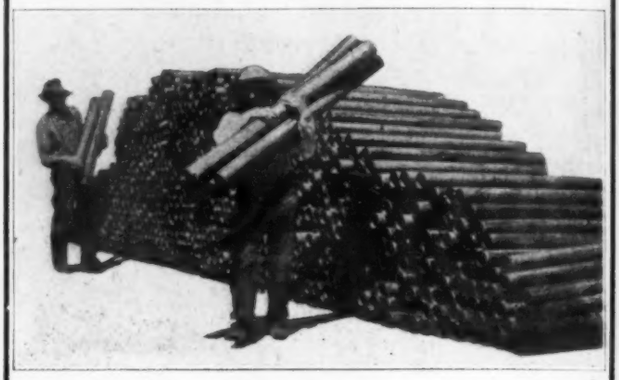
OSHKOSH MANUFACTURING COMPANY

OSHKOSH, WISCONSIN

NEW YORK, Northwestern Electric Equipment Company
PHILADELPHIA, L. K. Simons Electric Company
PITTSBURGH, Union Electric Company
SAN FRANCISCO, H. B. Squires Company

3T

100,000,000



Feet of

Orangeburg Fibre Conduit

have been sent to the trenches in the war on overhead wire maintenance. These sturdy built "Guards" are perfectly drilled, easily and rapidly transported; quickly put into action in narrow trenches and their protection it permanent. Booklet "T" will help you to map out **your** campaign—write for it today.

THE FIBRE CONDUIT COMPANY

ORANGEBURG, N. Y.

New York Chicago Boston San Francisco

STANDARD Telephone Cables

stand for over 30 years of successful experience in the manufacture and installation of electric cables. They represent the greatest advancement in the art of manufacturing telephone cables. Our engineering experience is at your service. *Write our nearest office for "Pointers on Telephone Cable Specifications."*

Standard Underground Cable Co.
Pittsburgh, Pa.

Boston Philadelphia Chicago
New York San Francisco St. Louis

For Canada: Standard Underground Cable Co. of Canada, Limited, Hamilton, Ont.

AWARDED PANAMA PACIFIC GRAND PRIZE

W & M Telegraph and Telephone Wire.

Strand and Pole Steps.

Made by

American Steel & Wire Company

Chicago New York Cleveland Pittsburgh Worcester Denver

Export Representative: U. S. Steel Products Co., New York
Pacific Coast Representative: U. S. Steel Products Co.
San Francisco Los Angeles Portland Seattle

Editors: ED. J. MOCK, PAUL N. WOODRUFF
New York Representative: CHARLES R. CONDON
New York Office, 1022 Longacre Building
Forty-second St. and Broadway
Telephone Bryant 7030

This publication is free and independent of all business or house connections or control. No manufacturer or supply dealer, or their stockholders or representatives, have any financial interest in Telephone Engineer or any voice in its management or policy.

Entered at Chicago Post Office as Second Class Mail Matter

Telephone Engineer

WITH WHICH IS CONSOLIDATED
The Western Telephone Journal
ESTABLISHED 1902

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
MONADNOCK BUILDING, CHICAGO, ILL.
Telephone: Harrison 3014—All Departments

NOTICE TO ADVERTISERS

Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements cannot be shown in advance of publication.

SUBSCRIPTION PRICE
Per Year $2.00

Canada	$2.50
Foreign	3.00
Single copy	.20

FOR SALE AT ALL NEWS STANDS

NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft or money order, in favor of TELEPHONE ENGINEER. Foreign subscriptions may be remitted direct by International Postal Money Order.

CHANGE OF ADDRESS.—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

If Your News Dealer Will Not Supply You—Please Notify Us

VOL. XV CHICAGO, MAY, 1916 NO. 5

Fifty Dollars a Week Will Do It

FIFTY dollars a week, or sixty at the outside, will put Independent telephony on the map in bigger letters than it ever displayed before. That much added to the present expenditures of the United States Independent Telephone Association—possibly a twenty per cent increase in the organization's payroll—will make it the most talked about factor in the telephone field, gain more for its cause than a battery of field workers, and raise more concentrated disturbance in Bell ranks than a government suit.

The whole Independent field needs a press agent—needs him worse than it ever needed anything—and the logical and only place for him to work is in the Chicago offices of the United States Association.

Perhaps some of our readers do not realize what a trained and clever press agent, or publicity man as some prefer to be called, can accomplish. A good one can get stuff into the newspapers which the newspaper editors, if asked about it beforehand, would emphatically refuse. That explanation alone, it will readily be seen, covers a vast amount of usefulness. But possibly we should be more specific.

Everyone who has taken press clipping service on telephone subjects knows that Bell propaganda is published everywhere. Newspapers all over the country publish the same items and stories, often without changing a word. Probably you thing the stuff gets in because the Bell people are big advertisers. That is not wholly true. We believe, in fact, it is only slightly true. Most of the Bell stuff is printed by the newspapers because it comes to them in interesting form, ready to "shoot to the machines." And the answer is that the Bell reading copy is prepared by an efficient publicity man.

We know considerable about the newspaper business. We know that good Independent telephone stories and propaganda would be printed by hundreds of newspapers if the copy was put into their hands in proper shape.

There is no big Bell stick that holds Independent facts out of the papers. Get that idea out of your mind. The facts do not appear because nobody supplies them, or in the few cases where they do, the "stories" are defective from a technical newspaper standpoint.

The average newspaper editor, contrary to some theories, is an independent spirit and enjoys stirring things up. The majority of them would welcome Independent telephone stories with some human interest and punch in them.

Preparing such stories is an art of itself. No man can do it in his spare moments, as a side line, or in a desultory way. It cannot be undertaken successfully, for example, by the secretary of an association in addition to his other duties. It is not in any sense an executive function. It is a specialized line of endeavor, whose followers have devoted their lives to learning the devious way of evading its obstacles and "putting it over." Everyone knows that a good theatrical press agent can get his company or his "star" onto the front page of a newspaper in spite of the fact that the editor has vowed to keep him off. That takes special talent. But it can be done just as well, and a whole lot easier with the Independent telephone industry than it can with an operatic prima donna.

A first class publicity man can be employed for about fifty dollars a week. Such a man can

guarantee to get the stuff he writes into the newspapers. Give him a typewriter, a copy of Paul Latzke's "Fight with an Octopus" and the files of the trade papers, and turn him loose. The result will be amazing.

Such a publicity man need not even know anything about the telephone business when he first tackles the job, because all of them are of necessity intelligent and keen. An occasional hour of instruction by the secretary of the association would serve to keep his copy logical.

We hope none of our readers will pass lightly over this idea. It is vitally important. It is an opportunity, humble as the means may be. The Independent telephone business, so far as the general disinterested public is concerned, is a dead one. Even its subscribers know nothing about the national status of the industry, while they have at least a little information, or misinformation, about the Bell system. This woeful state of ignorance the present Independent association and all its forerunners have done practically nothing to correct.

Without public interest and support no organization can accomplish anything permanent. The only royal road to the public mind is through the newspapers. This gate has always been closed in the face of the Independents because they did not have the little key that would open it. And they did not get the key because they held the entirely erroneous idea that it must be made of gold—that is, of advertising and subsidy.

We repeat, a good publicity man at fifty dollars a week can do more just now for Independent telephony than any other step the association could possibly undertake.

We want to see this thought put before the board of directors of the U. S. I. T. A. at their next meeting, and we hope they will act upon it and start rolling the big ball of Independent publicity.

The Bell Western Electric Question

WHATEVER may be the reason for the change of heart, our nearest contemporary at least appears to be taking a more reasonable and sensible view of the Bell-Western Electric entanglement. Only a year ago "Telephony," commenting on the (prospective) work of a committee of which its publisher was a member, said "It is hoped the work of this committee will be so thorough that this unfair alliance will be dissolved, resulting in an open field and precluding the possibility of a monopoly in the manufacture of telephone apparatus and supplies"—and a great deal more along the same line.

There never was any possibility of "a monopoly in the manufacture of telephone apparatus," in the first place. In the second place, as we pointed out at the same time—May, 1915—dissolving the Bell-Western Electric alliance and making independent the big Bell factory would be a bad thing all around for the Independents. We hammered on this fact several times, finally drawing the compliment of bitter comment by a Western Electric official, who assured us that we "had it sized up, all right."

A few gems of thought from the editorial pages of our contemporary's latest issue shows the subtle change: "Let the Western Electric Company continue to fatten off its Bell victims, but the Bell factory has no right to seek business in the Independent field"—"Being a Bell factory, the Western Electric Company should keep on the Bell side of the fence"—"The Bell factory should be driven from the Independent field. Let it wax fat off its non-competitive business in the Bell fold"—and so on.

We are forced to agree with the words of our contemporary, for they are practically our own sentiments repeated after a lapse of a year. We are rather disappointed about it, for we had anticipated a warm argument. Now the only satisfaction we have is that we said it first and stuck to it.

Now that they all agree with us, maybe we can put the case a little stronger. It is our firm conviction that the Independent manufacturers could not compete to advantage with an independent Western Electric Company. In spite of their claims of superior apparatus, circumstances would work the wrong way. The W. E. is already selling a distressing amount of equipment to Independent operators, despite the anguished pleas of association officers. The immediate effect of its liberation from Bell entanglements would be to increase these Independent sales. This for the reason that the Bell relation is the only factor of discouragement

now operating against such sales in a host of cases. Hundreds of Independent operators would at least listen to Western Electric salesmen if those gentlemen could say "we are just as independent as Kellogg or Stromberg," and say it truthfully.

On the other side, it would be the hardest task in the selling profession to get orders from a Bell operator for Independently manufactured equipment. Some sales would be made, of course; but mighty few, we take it. It would take more than a dissolution to turn the Bell operators out of the deep rut of Western Electric buying.

We do not know anything about the legal aspects of the Bell-W. E. combination. Possibly it will have to be dissolved whether we wish it that way or not. But even in that event we may recall with profit, if not with pleasure, that these court-ordered dissolutions sometimes have astonishing results, not at all what might be expected.

The parting of the A. T. & T. Co. and its factory would, we repeat, be a bad thing for Independent telephony. Conversely, it would be a good thing for the Western Electric Company, if it could be made the right kind of a dissolution—like that of the Standard Oil Company, for instance.

It would be so good for the W. E., in fact, that we expect to see it take the step of its own volition sooner or later. That will probably be the next big Bell move. Shut off a good percentage of present W. E. sales to Independents and see how quickly the W. E. will itself become independent.

No— the best card for the Independents to play in this game is to insist that the Western Electric be and remain wholly Bell—including its sales.

Get Physical Connection Into Chicago

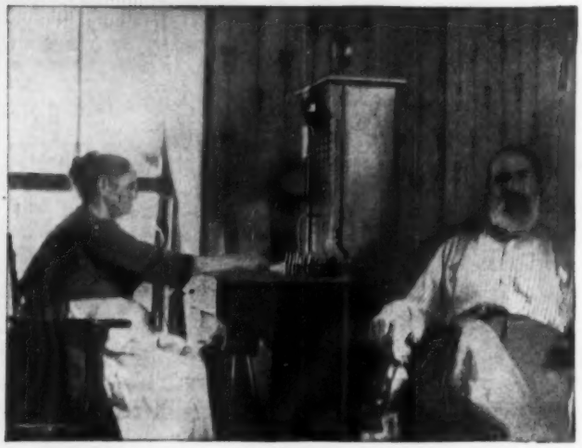
LAST month we referred to the Chicago merger as "not worth stopping." There is a feature of the situation, however, that demands action. Since Chicago is to be a Bell monopoly, and since the Independent operators outside would have enjoyed connection with the big town had the Chicago Independent succeeded, such connection should be granted them by the Chicago Telephone Company.

This, we are well aware, is distinctly against Bell policy. We have explained before, however, that this particular Bell policy deserves no recognition. We hope to see the Illinois Independents particularly press their cases so hard before the Illinois Commission that that body will order a connection with the Chicago Telephone Company.

In Wisconsin the commission and two courts have upheld the principle of physical connection, which is now up to the supreme court. Its decision, if favorable, will dissolve many difficulties like the present. But if the Wisconsin commission had the courage to issue such an order without precedent, the Illinois commission surely will not hesitate to take the same step, even if only to make another test case of it. It is in the interest of the public and of the Independent companies and opposed only by Bell arguments of questionable logic.

When the Chicago Independent operating company was at the height of its career, apparently supplied with all the requirements for success, the Independent companies serving the surrounding territory seemed assured of ingress to the Bell stronghold. It was roughly estimated that a million subscribers of those companies would use and profit by such connection—and it was even more obvious that the city of Chicago would profit. Independent toll lines would bring to the city by the lake a tremendous volume of new business which now, perforce, goes elsewhere. Particularly were the contiguous states of Illinois, Wisconsin, Indiana, Iowa and Ohio interested, and Minnesota, Michigan and Missouri in only slightly less degree. All of those states support big aggregations of Independent telephone property, none of whose subscribers have now, or ever had, access to Chicago's markets.

That the Bell company should deliberately pile obstacles in the path of this commercial intercourse speaks poorly for its boasted policy of public service. Every Independent message delivered to a Bell switchboard stands ready to pay its toll. The refusal to accept such business indicates nothing but the hope that some day there will be no Independent business, and that all lines will be Bell lines.



The Oldest Operators, Mr. and Mrs. Harry Moore of Linkville, Mo., Aged 72 and 66, Operate the Local Exchange of the Missouri and Kansas Telephone Company Day and Night—Western Electric News.

War Telephones in German Army Staff Headquarters "Somewhere in France."

Taken Not Many Miles from this Office, and Presented as a Horrible Example of Unsightly Aerial Situations.

Those who protest against the trimming of shade trees by telephone company employes, should view the neat, artistic and wholly unusual job of pruning accomplished by George Whittleton of the Southwestern Telephone and Telegraph Company at Marshall, Kansas. The result of Mr. Whittleton's work is depicted above, thanks to the Southwestern Telephone News. Needless to explain, the whole lead of wires goes through the nice round hole in the tree made by the telephone man's scissors.

Trouble Shooters at the Front. French Military Cyclist Whose Duty is to Repair Telephone Lines Broken by the Enemy.

Field Telephone of the British Royal Engineers Receiving a Message from Another Brigade.

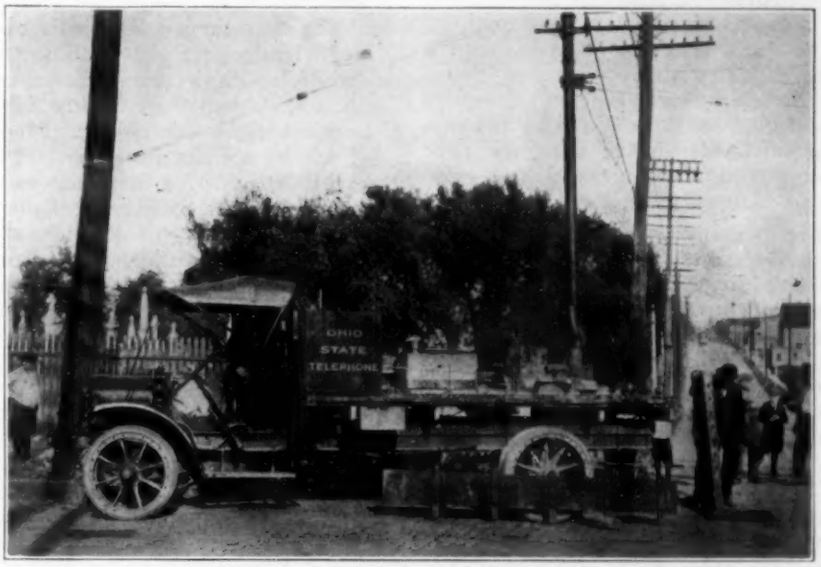
STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Modern Telephone Trucks

Specially Designed Motor Vehicles Facilitate Maintenance of Service

BY FRANK C. PERKINS

THE accompanying illustrations show the use of modern trucks in the service of telephone companies, the same economical work being done for the telegraph, electric light, power and electric street railway corporations. It will be seen that these trucks are equipped with especially designed bodies for the use of the construction departments of the companies. They are so designed that the many and varied items of delicate material may be carried in bins and compartments in the most orderly manner, both sides being fitted with compartments, bins and draws. Both telephone companies in Cleveland, Ohio, the Ohio State Telephone Company and the Cleveland Telephone Company, have tested the use of modern trucks with great success.



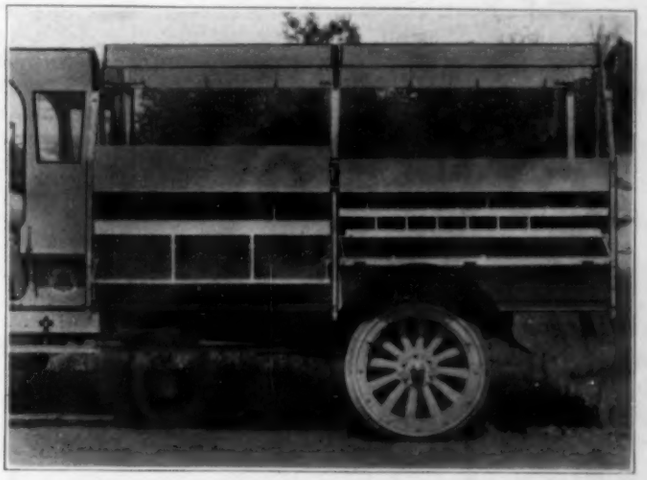
Truck of the Ohio State Telephone Company Equipped with Winch Driven Off the Transmission Gears for Pulling Underground Cables. Also Note Heavy Front Bumper.

Provision is made for the carrying of all necessary tool and construction apparatus in a position that makes them easily accessible for the workmen. Time formerly lost in locating material is practically eliminated by the use of these machines. They are fitted with the most modern equipment that it is possible to find in telephone service today.

It will be noted that facilities have been arranged for carrying the hand tools, a great many of which are necessary in telephone construction work, in such a position that they may be obtained almost instantly when going to the truck. Special brackets for the carrying of pike poles and ladders have been fitted and a place has been made for carrying tarpaulin during the winter months or in bad weather, and curtains completely house in the driver's cab. In addition to the two racks and side compartments there is a live loading space in the body of the truck that is available for carrying wire, reels and other bulky materials. The tail gate has been so arranged that, when opened, it provides a step for the workmen to enter the body.

It may be stated further that the trucks have been designed with a trailer coupling and a front bumper. Searchlights have been placed in front of the drivers. Some of the advantages of the searchlight are that if it is necessary at night or in times of emergencies, which in telephone work are occasioned by winter storms, this light may be directed to the top of a

A Truck of the Cleveland Telephone Company Showing How it Looks on the Road with Body Closed.



Special Truck Body Opened Showing Numerous Compartments and Bins for Carrying Telephone Equipment.

terminal pole or to the bottom of a manhole, or thrown on a cable line without changing the position of the truck. It is also of considerable help in covering suburban roads and outlying sections of the company's territory at night.

It is claimed that the main advantage of motor trucks to public service corporations is the saving of time which they are able to effect. The ¼-ton truck is used by many of the companies for delivering apparatus and supplies in the larger cities, as well as for light construction and general maintenance work in suburban territories, rural communities, and smaller towns. This truck is especially desirable for maintenance work due to the speed that can be made with it in safety, its carrying capacity and economical operation. In some cases the telephone engineers are equipping those used for light construction and maintenance work with special ladder irons, wire and rope hooks, knobs and material bins and make a most complete job for covering scattered territory.

It is said that the 1½ and 2-ton trucks in some cases are used for delivering supplies and telephone sets equipped with special bodies and trailer couplings, as well as rope, ladder and wire hooks. They are in a great many cases equipped with trailer attachments; that is, provision is made on the rear of the chassis frame for the connecting of a trailer. These trucks have been found most satisfactory for construction and general line, toll and long distance maintenance work and have proven a great favorite among telephone companies. They can be used with either the standard body or the special telephone body, as one's requirements may demand.

These trucks are important for aerial and underground cable construction work. The 3 and 5-ton trucks are being used by many of the larger companies for heavy construction work and are equipped with a special transmission, special winch construction, draw bar, skid boards, material bins, etc. The winch mechanism on this truck is the most modern in the United States today. There has been developed a double drum winch for the pulling of cable and it has met with great success wherever used. They have been found not only adaptable to telephone work, but to electric light and power work as well. In some cases they have more than paid for themselves in the first year's service.

With one of these machines it is possible to pull two sections of cable with one set-up; that is, it is only necessary to equip one manhole in order to pull in two sections of cable, thereby saving considerable time. Overhead as well as underground cable can be placed with them and for loading and unloading cable they have been found to be a most desirable truck. The driver operates the winch for pulling cable, load- and unloading cable, or driving, without leaving his seat.

With the four-speed transmission it is possible to pull cable at a rate of speed of fifty feet per minute or wind up rope or make light pulls at from fifty to one hundred and fifty feet per minute, as the occasion may require. Special study that has been given to pulling cable by this means has proven that it is possible to install cable with this machine with as great a degree of safety as by hand and the possibility of damage to the cable sheathing has never been questioned.

Southern New England Bell Busy

The annual report of the Southern New England Telephone Company states that the company's program for the year 1916 is one of the largest ever undertaken by it. Changes and additions originally planned for 1913 and 1914, but postponed on account of the conditions prevailing in that period, are now imperative; also, much that would ordinarily have been planned for a year or two later must be undertaken during 1916, particularly in those localities where the activity of manufacturing and general business is exceeding all expectations; while a third contributing cause is found in large fundamental building operations in Bridgeport and New Haven.

In Bridgeport plans call for an immediate enlargement of buildings to more than twice the present size, with foundations for further additions in the future. The work upon this enlargement is already under way, and within a short time the building will be ready for the installation of a large amount of additional central office equipment. This installation will be followed in July by the opening of an additional operating or central office unit of the Bridgeport exchange at Stratford, where land has been purchased by the company and a fire-proof building, to be used solely for operating, is being constructed.

In New Haven work will be begun on a ten-story fire-proof building on the rear portion of the property owned by the company on Court street. This building is so planned that it may be extended from time to time to meet future needs for additional space, and in the ultimate of later years will be a twelve-story building, fronting Court street and replacing all buildings now on this property. The initial ten-story building will be ready for occupancy in the spring of 1917, and will contain six floors for offices, two for terminal apparatus, one for operating room and one for operators' quarters, consisting of locker rooms, lunch room, rest room, etc. Much of the space initially used for offices will subsequently be used for other purposes, as the building is so designed that additional terminal apparatus, switchboard equipment and operators' quarters may be located in proper relation to associated equipment previously installed.

In the Hartford exchange two additional central office units will be established during the year, one scheduled for April in East Hartford, where the central office equipment is now being installed in leased quarters, the other scheduled for July in Wethersfield, where a building to be used for operating purposes has already been purchased.

In Meriden and New Milford land has been purchased for the erection of new telephone buildings, while similar purchases in Farmington and Newtown contemplate the utilization of existing buildings for central office purposes. All of these purchases are preliminary to the installation of new common battery exchanges, and a substantial portion of that work will be accomplished during 1917. New common battery equipment will also be installed in present quarters at Jewett City, and in new quarters at Moosup.

A program of similar expansion will be followed during 1916 in outside plant work. The numerous central office changes mentioned will of themselves require substantial additions and alterations in outside plant, and normal procedure in other directions will be supplemented not only by work postponed from the last two years but by large cable installations.

Directors of U. S. I. T. A. Meet

Discuss Bell Relations and Physical Connection for Chicago

PURSUANT to the call of the president, the directors of the United States Independent Telephone Association met at the Hotel LaSalle, Chicago, at 10:30 a. m., April 22. There were present A. F. Adams, Terry W. Allen, F. L. Beam, A. G. Bean, W. H. Bryant, P. C. Burns, J. C. Casler, H. D. Critchfield, J. B. Earle, E. B. Fisher, Hunter L. Gary, W. F. Goodrich, F. B. MacKinnon, W. Roy McCanne, C. Y. McVey, Albert Parlett, H. Linton Reber, G. W. Robinson, E. D. Schade, W. J. Uhl, W. S. Vivian and F. H. Woods.

After the reading of the minutes of the last meeting of the board, President McVey stated that Messrs. McMeal, Kelsey and Fargo of *Telephony* desired to make a statement to the board. President McVey therefore suggested that these gentlemen be heard before the board took up the routine business that would probably occupy the remainder of the day. This suggestion being agreed to, Mr. McMeal was invited to address the board on the question he and his associates desired to have discussed, which was the necessity for positive action by the association in the matter of the relationship of the A. T. & T. Company and the Western Electric Company. Mr. McMeal called the attention of the board to the serious condition existing in the manufacturing section of the Independent industry, and urged the board to lend all assistance possible to the Independent manufacturers. Mr. McMeal was followed by Messrs. Kelsey and Fargo, emphasizing Mr. McMeal's statements. A discussion developed the fact that while it was generally agreed that some action in the matter should be taken by the association, yet no definite plan had been formulated. Accordingly the board appointed a committee of five to investigate the situation and report to the board as to the best procedure to be followed by the association in aiding the manufacturers. This committee consists of A. G. Bean, P. C. Burns, H. D. Critchfield, L. D. Kellogg and W. Roy McCanne.

Secretary Vivian then presented the reports of the membership and service committees and Vice-President MacKinnon the reports of the accounting, valuation, legislative and toll contract committees. The report of the toll contract committee was amplified and explained in detail by Mr. McVey and G. R. Johnston of the Ohio State Telephone Company. This latter company has been making a detailed study of traffic conditions in Ohio looking to the application of the new form of toll contract proposed by the association for competitive companies desiring connection with the toll lines of the Bell Company to non-competitive points. It was announced by the committee that during the last three months a general survey of the situation has been made by a subcommittee working in conjunction with a similar subcommittee from the Bell Company. In connection with this survey the committee visited or conferred at conference with the following "A" class companies:

Tri-State Tel. & Tel. Co., St. Paul, Minn.
Kansas City Home Tel. Co., Kansas City, Mo.
Kansas City L. D. Tel. Co., Kansas City, Mo.
Kinloch Telephone Company, St. Louis, Mo.
Citizens Telephone Company, Grand Rapids, Mich.
Louisville Home Tel. Co., Louisville, Ky.
Indianapolis Telephone Co., Indianapolis, Ind.
Ohio State Telephone Co., Columbus, Ohio.
Pittsburg & Allegheny Tel. Co., Pittsburg, Pa.
Consolidated Telephone Co., Hazelton, Pa.
Keystone Telephone Co., Philadelphia, Pa.
Rochester Telephone Co., Rochester, N. Y.
Federal Tel. & Tel. Co., Buffalo, N. Y.
Home Telephone Company, Fort Wayne, Ind.
Automatic Telephone Company, Dallas, Texas.

The sub-committee also aided in a joint study of Ohio conditions—that state being used as an example. A number of meetings have been held in New York to discuss the proposed contract with the Bell committee. A final meeting in connection with the matter is to be held in New York, May 16, at which time it is hoped this serious effort of the association's committee to work out a plan for a contract will be crowned with success.

After the discussion of the toll contract committee's report was completed, adjournment was taken for lunch. After lunch there were presented to the association by Vice-President MacKinnon several notices from the United States Department of Justice in regard to proposed sales of Independent properties to the Bell Company—also notices requesting the association to notify the department if the association joined in several protests that had been made by individual companies.

A prolonged discussion of the various phases of the situation resulted in the passing of resolutions reaffirming the instructions given the officers of the association to see that proper protests were made to the Department of Justice to all apparent violations of the so-called "Kingsbury commitment" and the federal anti-trust laws generally.

Mr. Vivian called attention to the Chicago situation with the suggestion that the association should officially participate in an effort to secure to the Independent telephone companies a continuance of service into the city of Chicago. After a discussion the officers were instructed to enter an appearance for the association at the hearing before the Public Utilities Commission of Illinois in Chicago, April 22, in an effort to provide for, preserve, protect and perpetuate the interchange of telephonic messages between all present and future telephone subscribers of the Chicago Telephone Company and the subscribers and patrons of the Independent telephone companies now having service in and out of Chicago over Independent lines, and also that protection be given to the right of Independent telephone companies not now having direct connection with the Chicago Telephone Company to establish that connection.

A resolution introduced by Mr. Reber read as follows:

Whereas it has been the practice of the Department of Justice to notify the United States Independent Telephone Association of all proposed sales or mergers of telephone properties coming to the attention of said Department, and whereas, in the absence of objection or protest by the United States Independent Telephone Association, the Department of Justice has apparently assumed there is no objection to such sales or mergers, and whereas it is beyond the present resources of the United States Independent Telephone Association itself as an association to become a party to any such controversy and whereas this association is strongly in favor of the enforcement of the Kingsbury commitment, now therefore be it resolved that the Department of Justice be requested to notify this association as heretofore, of all proposed sales or mergers so that it may notify its members, thereby affording them an opportunity to protect their interests as they

appear, and be it further resolved that Vice President MacKinnon be instructed to transmit a copy of this resolution to the Department of Justice for its information.

It was moved by Mr. Earle and supported by Mr. Robinson that the resolution as read be adopted, and the motion was carried.

Mr. Bryant moved the adoption of the following resolution:

Resolved that the officers of the association be directed to protest to the Department of Justice in the name of the association any proposed violation of the Kingsbury letter of commitment.

This also was supported and carried.

The board adjourned to meet at the call of the president.

Telephone System in Brazil

Vice Consul Richard P. Momsen, Rio de Janeiro, says there has been much said during the last few years concerning the extension of Brazilian telephone systems. According to reliable authority there are at present in the Federal district and immediate vicinity 12,000 telephones in service in Rio de Janeiro, 1,200 in Nictheroy (the capital of the state of Rio de Janeiro, situated across the bay from the Federal capital), 750 in Petropolis (the summer resort of Rio de Janeiro), 100 at Barra do Pirahy (at the junction of the branch railway lines from the Federal capital to the States of Minas Geraes and Sao Paulo), 23 at Barra Mansa, and 19 at Rezende. A station was recently completed at Mendes and one has been established at Campos, state of Rio de Janeiro, with a few subscribers.

With the exception of the last-named station, those mentioned are under the control of the Brazilianische Elektricitäts Gesellschaft in Rio de Janeiro, and the suburban cities under the management of the Interurban Telephone Company of Brazil, both part of the Rio de Janeiro Tramway, Light & Power Company (Ltd.), with headquarters in Rio de Janeiro. It is estimated that in this section of Brazil there is one telephone for each 100 inhabitants. Much of the wiring of the system is of the underground type.

In the state of São Paulo and the southern part of the state of Minas Geraes, the telephone systems are operated by the Companhia Telephonica do Estado de São Paulo, with headquarters at São Paulo, Santos, and Campos, which is also a branch of the Rio de Janeiro Tramway, Light & Power Company (Ltd.), and the Companhia Rôde Telephonica Bragantina. The first-named company has about 8,000 subscribers in the three cities just mentioned and a number of suburban lines. There are also connections with the lines of the second-named company, which has its headquarters at São Paulo city, the capital of the state of the same name. The Companhia Bragantina connects, by its lines, 171 cities and towns in the states of Minas Geraes and São Paulo, serving 4,500 subscribers. Besides these two companies there are numerous smaller local companies in many cities and towns of those two states, still further completing the facilities of connections.

Conversations may be carried on over the telephone from the city of São Paulo to Riberao Preto, in the same state, a distance of 339 kilometers (211 miles), or between Riberao Preto and Santos, 419 kilometers (260 miles), or with Guaratingueta, a distanc of 550 kilometers (342 miles)—a distance greater than that separating the Federal capital and the city of São Paulo. There is also a telephone system at Juiz de Fora, State of Minas Geraes, operating under the Companhia Mineira de Electricidade of that city.

Connection may be obtained from São Paulo to Guaratingueta and from Rio de Janeiro to Barra de Pirahy; and the intervening unconnected distance to complete the telephonic communication between the cities of Rio de Janeiro and São Paulo is but 165 kilometers (103 miles). Although formerly there apparently existed some difficulty in obtaining permission of the government of São Paulo to cross the state border, this sems to have been arranged, and probably the only reason that the line has not been completed has been the lack of capital. It seems certain that it is only a question of a very short time until the work will be under way; and it is claimed that it will form a system, whose various sections are operated under separate companies, that will connect 50,000 instruments.

5,500 Telephone Men to Dine

Five thousand five hundred telephone men will gather in New York, Philadelphia and Baltimore on Friday night, May 19, at dinners, the feature of which will be the use of the transcontinental telephone line to bring together the diners of the three cities. In New York 3,000 members of the Telephone Society of New York from the metropolitan district, which includes New York City, Westchester county, Long Island and northern New Jersey, will hold their 165th meeting in the Seventy-first Regiment Armory, Park avenue and Thirty-fourth street. One thousand five hundred employes of the Bell Telephone Company of Pennsylvania will gather at the same time in Philadelphia and 1,000 employes of the Chesapeake & Potomac Telephone Company will attend the dinner.

Union N. Bethell, senior vice-president of the American Telephone and Telegraph Company, and president of the New York Telephone Company, will give an address by telephone to the men of the three telephone societies.

To Instruct Foresters

As an aid to the better protection of the millions of acres of national forests under their jurisdiction, the foresters have inaugurated a special correspondence course with the forest rangers to instruct them in the more efficient management of the telephones and lines on the forests.

Because of the adverse conditions attending the construction and maintenance of telephone lines through the mountain forests, such as snows, slides, electrical storms and falling timbers, the problem of efficient service is an important factor in the protection and administration of the forests. It is to promote this efficiency and particularly to insure against the failure of the lines to work in emergency that the course has been inaugurated.

The course is planned to teach the rangers the elements of electricity and magnetism on which the telephone apparatus is based. Under the supervision of the district telephone engineer of the forest service, detailed texts and drawings are made to show the construction and working of each part, and the theory of both is grounded and metallic circuits and mechanism is explained. The lessons, which will require from three to six months to complete, will be supplemented by practical demonstrations in the forests by the telephone engineer during the field season.

Serving by Telephone

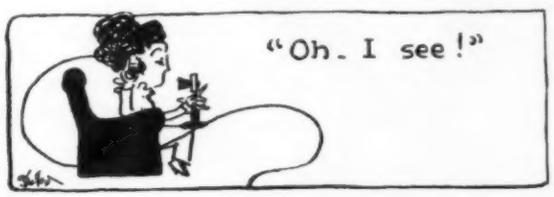
Instructions to Employees Issued by the Georgia Railway and Power Company, at Atlanta

UNDER strict analysis, the telephone is a substitute for an original. So is the letter. The original of each is the personal conversation wherein those who engage each other are present actually, face to face.

Notwithstanding its great convenience, the telephone, being a substitute, does not include all the elements of its original. It is at a disadvantage.

In the first place, it is liable to intrude upon your attention at a moment when a personal caller would wait; and therefore one must be more than ordinarily careful to respond without show of impatience.

Secondly, the inquiry that comes by telephone is to be answered usually right then—unlike the answer that



would go by mail, in a carefully considered and signed letter.

Again, because your telephone caller cannot see you and interpret your manner and expression, your voice alone must impress him with the sense of your courtesy.

Yet again, in exceptional cases your telephone caller, feeling himself remote and impersonal, may be more direct in getting to his point than he would be if he were before you; he may be even rude. To guard against resentment under these circumstances is to prove the degree of your own self-control, the extent of your own courtesy.

The difficulties of serving by telephone make it important that we should render this service with extra care.

Serving by telephone is, of course, just one of the phases of a company's daily business. Nevertheless, it is an integral phase of that business, and as such it merits our attention and interest.

Serving by telephone has many aspects in our work.

There is the service rendered by our own switchboard operators in directing to the proper department or individual the caller who knows nothing of our organization.

There is the service rendered by the department or individual called by error, in seeing that the caller is transferred with dispatch and courteously to the other telephone where his or her mission can be given attention; or in accepting the caller's message and releasing the caller and transferring the message to the proper department.

There is the service of receiving graciously the information tendered by some friendly caller whose purpose is to aid us in a detail that may be or may not be interesting or important.

There is the service of arranging that when you are called but are out at the moment, you will be informed of the call when you return, so you may give it attention without necessitating its repetition.

There is the service among departments of quick response for the sake of greater efficiency.

There is the service, in emergencies, of protecting the department combating the emergency by answering in its behalf until its attention is free to resume its own serving by telephone.

There is the service of receiving and satisfying complaints.

In a business such as ours, not understood by the

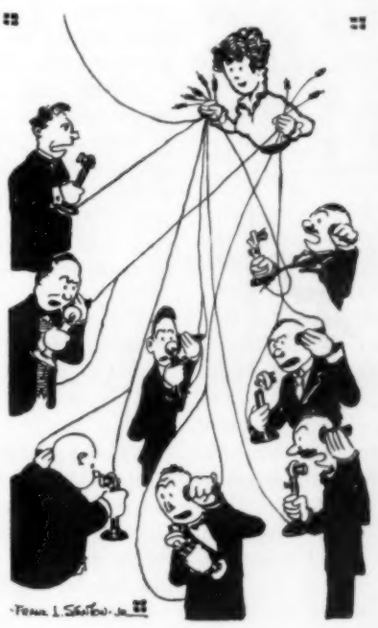
average member of the general public, it is inevitable that complaints will arise.

Our great work is in encouraging those complaints to be made to us, and in satisfying them.

A complaint voiced to someone outside the company gets nowhere, remedies nothing, leaves the complainant dissatisfied.

A complaint made to us is valid and effective. We can apply the remedy—and we're anxious to apply it. We can satisfy the complainant—and we're interested very much in doing nothing short of that.

Whether the complaint by telephone seems reasonable or unreasonable, its courteous reception by anyone in behalf of this company is vital to the company's interest. Its impartial investigation is essential, and full and satisfying report upon it to the person who made it must be given if we are to retain that public good-will without which we cannot progress.



Complaints by telephone are prone to be incomplete unless we are careful to elicit by proper questioning the details that are needed. Get a clear understanding of the exact nature of the case, else you will be left at a disadvantage.

It is established by the experience of public utilities that the majority of complaints are due to misunderstanding.

We must not expect the person with the complaint to know those things which experience has made commonplace to us. We must not expect him to perceive the remedy that is so obvious to us. His difficulty may be an old story to us because we have known scores of similar cases. But it is new to him.

By no means is the complaint due invariably to misunderstanding, how-

ever. Very often it is real and founded on good reason.

Therefore we must bear in mind that every complaint that is to be received courteously—or, if the complainant is out of temper, impersonally at least; and is to be investigated with interest, and answered fully. Discourtesy toward a patron in any circumstances is a betrayal of the company's interest. Discourtesy toward a

patron already ruffled or angered or suspicious or accusing under some inconvenience would be lamentable error indeed.

But though it be possible for something to go wrong in the extensive business we do with so very many customers, it is quite impossible for that thing to stay wrong longer than it takes us to learn it and correct it.

Our business is not alone in giving the complainant the benefit of every doubt. Nor are public utilities as a class alone in that policy. All large businesses practice it.

There is the story of the woman who bought a dress and changed her mind when she looked at it in her home. She sent her husband back with it to Green & Brown's store, but he returned it by mistake to Black & White's. When they demurred that they sold no dresses like that, he became indignant. Thereupon, without further protest, they paid him the refund he claimed. He discovered his mistake when he horrified his wife that evening with his report; and he has been apologizing ever since, says the story, to Black & White. The wisdom of the policy of satisfying complaints even if generous concessions are exacted has won broad recognition.

We are interested in finding the real cause of every complaint, whether it be due to misunderstanding on the customer's part or is justified by fact. In any event, our attitude is that by extending to us this opportunity for rendering service the customer has conferred a favor.

We do not evade complaints. On the contrary, we seek them and welcome them in order that we may erase them.

Remember these things when you are serving by telephone.

Strange as it may seem, the truth is actual that many people—perhaps some among our own number,

even—are awkward and self-conscious in manner and speech when they talk over the telephone.

There is the matter of telephone etiquette, which consists of a few very simple suggestions evolved through years of effort to make telephone intercourse smooth and easy.

There are no more than suggestions, but the discerning man and woman observes them as any other accepted social code is observed.

For instance, there is the obligation incumbent upon each one of us to answer promptly the ring of our telephone. Our caller is waiting.

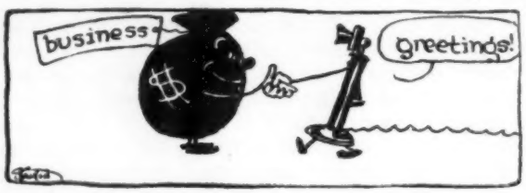
There is the suggestion that even though the bell has rung long and loudly and insistently, our caller is by no means responsible and would have good reason to feel a slight if we throw a gruff salutation into his ears.

The easy conversational style of telephone speech can be cultivated almost unconsciously. If it be distinct and a little more deliberate than ordinary speech, it is quite an asset.

On a private branch exchange, outside calls are received by the company's central operators first and then are connected with the proper telephone. Your caller, therefore, knows he has arrived by telephone within our building. Your salutation need not be more than a succinct statement—for instance, "Purchasing department" or "Mr. So-and-so speaking."

Telephone etiquette contemplates that the caller will introduce himself or herself as soon as you arrive at the telephone. But in the event this is overlooked, it behooves you to learn your caller's identity as early as is convenient. This will insure against a situation wherein you have received a message from an unlocated source and are as confused by it as you would be by some urgent but unsigned letter.

It is best not to keep your caller waiting if you have some investigation to make before you can dispatch his



business. The accepted course is to ascertain the caller's number, and ask permission to call that later. Waiting is disagreeable under any circumstances, particularly at the telephone. Also it ties up our telephone equipment needlessly.

The seeming impersonality of telephone conversation relieves us from none of the obligations incurred in personal dealings. One should be careful about making telephone promises, and literal about fulfilling them. One should be accurate in giving or receiving data, and prompt to confirm them by mail if they be important.

The company's telephone equipment is primarily to serve business purposes, but personal calls are permitted of course. This privilege should not be exercised frequently, because its abuse not only would tax the facilities at hand but would also indicate poor regard for the company's right to one's time in business hours. Each department or office manager may construe this privilege as conditions indicate.

Railroads to Have Girl Operators

Another man is about to lose his job to a woman.

This time it is the railroad telegraph operator, according to M. H. Clapp, superintendent of telegraph of the Northern Pacific Railroad in St. Paul, who addressed a committee of the Association of Railroad Telegraph Superintendents at the Hotel La Salle, Chicago.

"The 'hello girl' is slowly but surely superseding the 'brass pounder,'" said Mr. Clapp. "The telephone is replacing the telegraph in dispatching of trains and other railroad work. It is an excellent check on orders."

Telephone Talks

The Final Installment of an Instructive Serial Course for all Telephone Workers

BY G. W. CUMMINGS AND ARTHUR KNEISEL*

THE announcement that it was to be the last meeting of the season of The Technical Club, coupled with the news that the General Manager had accepted the invitation to meet with them, served to bring out the entire membership and its friends. A self-appointed committee had gathered contributions so that the usual heterogeneous collection of pipes might be displaced by good cigars. A hush of suppressed excitement and anticipation pervaded the atmosphere and the appearance of the General Manager brought forth that applause which men accord to their superiors when they know of them rather than know them.

Arthur Kneisel.

G. W. Cummings.

The reading of the minutes and unfinished business were quickly disposed of and, aside from a motion calling for the appointment of a committee to arrange a dance for the club, no new business was transacted and the discussion period of the meeting was soon reached. The President in introducing the speaker, stated that he would be accorded the usual privileges of answering questions raised by any present.

"It seems strange," began the General Manager, "that the man who is held responsible for the satisfactory and smooth running of an organization by the Board of Directors, should need an introduction to his fellow-workers. When I started in the telephone business there was no general manager and each one of us knew the manager personally, often through his 'daily bawling out session' in the stock room as he distributed the work each morning. Now, the organization of our working force has grown so large that the connection between the men who really do the work and the management which is held responsible for that work, is principally through a number of reports from the various departments. The present system has great disadvantages and is one which exists perforce of circumstances rather than through a matter of choice. I believe that many improvements in service would be tried if the men suggesting them could be in closer touch with the management and I think that misunderstandings between the men and the company would remain unexplained no longer than it would take for one man to tell his version of any matter.

"Consequently it was with pleasure that I accepted your invitation to meet with you and to spend an evening talking shop. I will tell you a little of the past history of our work and then try to bring out some of the characteristics necessary to make a successful telephone man.

"The telephone Profession may be said to date from the commercial adoption of the magneto switchboard with its drop shutters which fell to signal the operator that a subscriber had turned the crank of his generator. All instruments were equipped with batteries, and a repairman, who by the way was also installer, inspector, collector or anything else that circumstances demanded, always carried materials for replenishing the batteries. There were no dry cells and renewing batteries was a messy job even when we did not find it necessary to make a special trip to replace a jar broken by the freezing of the solution. Under such conditions it was a religion straining incident. With the adoption of the central energy switchboard and its greatly symplified instrument circuit this disagreeable part of the work ended. After the change to central energy was begun, improvements came in such rapid succession that we were on the jump constantly to learn the new circuits and apparatus. We had no plant department schools and there was no use in asking the manager. He didn't know. People were learning the advantages of the telephone and he was busy promising when new subscribers would get service while at the same time he was trying to find men to organize his working forces in a manner to cope with the demand for service. It seemed but a few weeks between the announcement that a superintendent had been appointed, and the announcement that his work had been divided into the two departments—construction and maintenance, with a 'foreman' over each. And we were not accustomed to these when further subdivisions came. The engineering department had also been formed to plan for increases in plant which would satisfy the demand. This rapid growth of the business called for initiative on the part of every one connected with it. Then came

the Independent movement which swept over the country and assisted so effectively in meeting the demand for service.

"The entry of many Independent manufacturers in the field naturally created a keen competition for improved apparatus and this competition gave men possessed of initiative, the opportunity to develop and become greater engineers with each success. At first the Bell apparatus manufacturers refused to sell to any but Bell companies, and the competition was keener and the development of new apparatus more aggressive among the Independent manufacturers than in the Western Electric Co. This may have been due to the fact that the latter company had an assured market and that it considered its apparatus 'standard' and consequently preferred to make as few changes as were absolutely necessitated by increased demand for telephone service. The fact stands, that after the adoption of central energy, many of the improvements of commercial value were made by engineers employed by Independent manufacturers. Apparatus for long distance work, however, is an exception. The commercial repeater and the loading coil are 'Bell' products. The self contained switch-hook, the insulated transmitter, the concealed binding post receiver, harmonic and synchromonic vibrators, call distributing, automatic and semi-automatic systems were all made commercially possible first by Independent engineers. Some of these have been adopted by the Bell companies and others will no doubt come into more general use after the Bell manufacturing company has proved to its own satisfaction that they do give improved service at lower cost. Possibly some of the later types of equipment would be used more extensively today if it were not one of the policies of all Bell controlled companies to purchase from one manufacturer only.

"Since the demand for telephone service has been satisfied to the extent that the supply is nearly equal to it, mergers and consolidations between smaller companies and between Independent and Bell companies, are more numerous than the formation of new Independent companies. The establishment of state public utilities commissions is probably the greatest step in the solution of giving the public the most efficient service for the established rates and in promoting confidence and good will between telephone companies and their subscribers. These commissions investigate complaints against public utility corporations, such as telephone companies, where its patrons are dissatisfied with the results of their complaints to the companies. They also pass upon the reasonableness of rates when these are in dispute and determine what is a fair return to the investors in public utility securities. It is unlawful for a telephone company to issue bonds or increase its capital, to change its rates or in fact to do anything more than give service, without special permission from the state commissions.

"Therefore the keynote of our work as employees of the telephone company is to render service to our subscribers. I would give as a definition of telephone service: The building up of a connection over necessary apparatus and equipment to enable two or more subscribers to hold a telephonic conversation with each other. The rendering of telephone service must be uninterrupted, for the subscriber is not interested in knowing that a cable has 'gone wet' or that lightning has burned the carbons or any of the numerous agencies which interfere with the proper operation of lines and apparatus. He is paying for service and wants it whenever he calls for it. To satisfy him, the company must carry more employees than would be necessary if the elements were more dependable. We must really get 'trouble' before it is trouble. That is why we call for routine inspection of all apparatus and equipment—in other words we must do our work before it is apparently necessary. This same requisite is one of the characteristics of a successful telephone employee.

"He must be there with the goods at the time it is called for. While a college education is no doubt a great help in the making of a good telephone man, it is not absolutely essential that he have a university degree. But he must learn the theory of the principles upon which the operation of telephone apparatus depends. Many good books have been written on the subject that anyone can acquire the theoretical principles by home study. He should subscribe for *and read* at least one telephone magazine, for the art is changing constantly and the text books of today will be merely history in ten years from now. In reading a periodical it is well to remember that any device or apparatus which is shown or described in the advertising section of the paper is more apt to be practical from a commercial standpoint than if it is shown under the new patents which have issued. In many cases the latter have not gone through the refining pot of the factory and may be impractical.

"While an employee may study all the publications issued relative to his work and may have the ability to apply the knowledge gained thereby, he is of little value if he lacks loyalty. An ounce of loyalty is worth a pound of ability. He must be ready to serve at all times if emergency requires it. If he refuses to work during a stormy night to clear trouble which may endanger life and limb merely because he has put in his day, he is in the wrong line of business. I do not mean that every case of trouble must be cleared as soon as reported if this happens during the night. But if a fire destroys cable or overhead construction, this should be taken care of immediately. Any trouble which affects a considerable number of subscribers should be cleared without delay.

"A successful telephone man must possess tact—particularly in dealing with the public, for it is through those employees with which the public comes in contact, that it forms an opinion of the company. If an installer upon failing to get an operator immediately upon connecting up his line, shows any indications of disgust or impatience with the traffic department, he may create the impression that traffic is not on the job at all times and thus be the cause of a chronic kicker. A high percentage of telephone complaints are psychological and a cheerful voice or appearance on the part of the employee can do much to avoid such complaints. If you show that you do not respect your work, you will find that those who know you and do not know as much about your work will respect it even less. Your knocking the work of any other department will not help matters and can only do harm.

"Summarizing, I should say the characteristics of a good telephone man are, first loyalty, second tact, third studiousness, fourth ability to apply the knowledge gained through study and fifth concentration of thought upon the task at hand and these are really the requisites for success in any line of business."

"Are there any questions? The meeting is open for discussion," announced the President, when the speaker had finished.

After quite an interval the Repairman arose with an air of bravado which almost tinged of defiance. "I would like to ask if a man should put loyalty to the company or loyalty to himself and his family first?"

"Personally, I would put loyalty to myself and my family first," responded the speaker, "but it seems to me that my family and the source of its sustainence are so closely allied that loyalty to one is really loyalty to both. I put loyalty to myself first, because I must live with myself when I might possibly get away from everyone else. It is the best safeguard to honesty there is in the world."

The Switchboardman was then recognized and asked, "Is not loyalty really reciprocal?"

"It is reciprocal as is evidenced by the welfare work now done by the company," replied the G. M. "We are fostering baseball clubs, tennis tournaments, rifle ranges, choral clubs, orchestras, field day sports, sick benefits and old age pensions. These activities are not promoted in a spirit of charity but because we believe it good business to do so, but they are an indication of loyalty on the part of the company toward its employees. Now, to forestall a question which no doubt is in your minds, I will say that we might devote the money required to promote these activities to increasing the salaries of our employees, but this is where the good business comes in. If we used this money in increasing salaries it would not be applied for the same purpose in many cases and we would fail to get the benefits to be derived from the broadening influence of this welfare work. The money required for this work, applied in bulk, is no doubt more effective than if it were applied to the same purpose by the individual recipients of its benefits."

"If loyalty is reciprocal, why does the average switchboard man, who is responsible for such costly equipment, receive less salary than does the average lineman or cable splicer?" asked the Switchboardman. "To the switchboardman who must necessarily have a better education than the lineman and who must dress better, it appears a discrimination against the man who has been so loyal as to refuse to ally himself with anyone else in solving his own economic problem."

"It costs money to wear a white collar," interjected the Lineman, before the President could gavel him to order.

"It is true that in some cases, outside men receive higher remuneration than those employed inside, but sometimes it is absolutely compulsory to acceed to what may seem unfair to us in order that service to subscribers shall not suffer. The company has tried to be fair in allowing each employee to decide for himself whether he wished to be dictated to by a walking delegate or whether he wished to rise through his own efforts. While the company tries not to interfere with any man allying himself with any organization or society it naturally cannot be blamed if it does not gush over any organization which interferes with the one duty of the telephone company—the rendering of service to the subscriber.

"I think that what you may think an unfair condition is an effect rather than a cause. It is probably the effect due to the fact that the telephone industry or rather profession has not caught up with itself entirely and there has not been sufficient time to permit us to look about us and rectify any uneven conditions which may exist. Eventually it will be the survival of the fittest. The inefficients, of whom there are quite an appreciable number, will have to make way for the efficient workers, and there will be less of these efficient workers per 1,000 telephones than there are employees now, but they will be better paid. With public utility regulation by commission it may be possible to educate the telephone using public that if it requires higher salaries to employees to give good service, they must pay these higher salaries in increased rates. A telephone company is organized primarily to pay dividends to the investors in its securities and all commissions realize this to the extent that in rate revisions they allow for a reasonable return upon the money invested. The manager of the property is hired to manage the property so it will pay dividends and he must make good just as the repairman must make good in clearing a case of trouble."

"Speaking of loyalty," said the Cable Splicer, "why is it that the man who makes a suggestion for an improvement in doing our work does not get credit for it? I have seen several instances where men found better ways of working which were adopted later, but the credit went to someone higher up."

"This seems to be one of the instances to which I referred early in my talk," said the General Manager. "I did not know that every man is not getting credit for his accomplishments and I trust that this does not exist to any great extent. In as large an organization as ours it is possible that credit for improvements is pirated at times, but this is entirely foreign to our policies. I should like to have such a case brought to my attention in order that I can investigate it."

Three or four requested recognition at once. The chair called upon the Wire Chief.

"I do not think that piracy is practiced as much with this company as in many others. It is a disease of the entire telephone field from which it has never entirely recovered. I recall a case many years ago when we first began supplying battery current to private branch exchanges from the central office. The battery leads to these exchanges were fed from a fuse panel, common to all of them. Sometimes a fuse blew and we knew nothing of it until the board was reported out of commission. To remedy this trouble one of the boys added a small german silver clip under the fuse binding post on the bus bar and suspended the fuse wire from this clip to the other binding post so that the wire was under tension. When the fuse let go the german silver clip made contact on a common alarm wire and rang a bell to announce the blowing of the fuse. Shortly after this a representative of the telephone manufacturing company visited the exchange and commented on the ingenuity of the plan. Not very long after this our present alarm fuses were devised. The principle of the alarm fuse was undoubtedly demonstrated by the little german silver clip device but that man got neither credit nor cash for his suggestion. As a matter of fact he did not invent the alarm fuse proper, but it would be difficult to persuade him that he did not invent the principle."

Several men arose with an air that they could tell a tale of woe, but the President again gaveled the meeting to order. "We could probably listen to many a story along this line some of which may have a foundation, but nothing can be gained by such procedure. It would be wiser to offer suggestions which would tend to prevent piracy of suggestions."

"I think that much could be done to allay distrust if we had some means for sending in suggestions to some specific official and keeping a copy of the sugges-

tion for our personal files," said the Switchboardman. "Why would it not be feasible to have something on the order of a sales registering device at each exchange building where any man may record his suggestion in triplicate, the original of which he could take with him while the two copies would be wound on spools, one for record and the other to be passed to the proper department for consideration."

The "G. M." was then recognized. "It never occurred to me that anyone in the telephone business expected all the credit for his work. I have seen many instances such as related by the Wire Chief and I think that such cases are becoming more rare. Early in the game we felt that we were contributing to the development of the most wonderful of arts and we never thought to whom the credit was due. In view of the fact that fifteen years ago a man received one-third the salary now paid for the work and at that time we were supposed to be on the job eleven hours per day, I think there is no reason for any telephone man to become discouraged. Opportunity is knocking louder than ever but only the live wire hears her. Each one of you has eight or nine hours per day in which to do your work, but what you do and also what you refrain from doing during the remaining 17 or 18 hours of the 24 has great bearing upon your progress in the telephone field. We are at present on a ledge, so to speak. Before long the installation of automatic and semi-automatic apparatus must be undertaken by Bell companies and we must have men who learn the new practices as they are adopted. The man who is ready to deliver the goods when called upon will rise naturally. Others will hold their own until some live wire coming up from the bottom temporarily crowds them aside on his way to the top. There is no rule by which a man can succeed permanently through another's assistance. Success is nine-tenths perspiration."

"A rising vote of thanks to our General Manager for the advice given, is in order," said the President. "I believe that we are all better off for this session, which has given us the opportunity of airing our views to one another. We hope that such sessions will be held more frequently."

The motion was made and adopted.

"I wish to thank you for your invitation," said the general manager. "I have enjoyed the frankness of the discussions and hope to meet with you again."

"If we have no further business a motion to adjourn until we meet to discuss 'More Telephone Talks' is in order," said the President. The motion was made, seconded and carried.

"Don't forget to boost for the dance!" shouted one of the committee as they were leaving the room.

Chicago Telephone Issues $3,000,000

The directors of the Chicago Telephone Company, at a meeting held March 30, authorized the issuance of the balance of $3,000,000 of unissued capital stock of the company.

This stock is offered for subscription at par to stockholders of record May 1, 1916, pro rata to their respective holdings. The subscriptions close June 1, 1916. Payments are required 50 per cent July 1 and 50 per cent October 1, 1916. The Illinois Public Utilities Commission recently approved the issue and sale of this stock.

Telephone Service in Hawaii

The Public Utilities Commission of the territory of Hawaii recently reviewed the work of the Mutual Telephone Company, which controls the automatic system of Honolulu, as well as the manual system operated on the island of Hawaii, from Hilo as the central station, encircling the island. The commission states that the company is financially sound, that the tariff on city instruments in Honolulu will not be raised, and that the employees receive liberal treatment. It finds that the climate causes a rapid depreciation of the plant.

The total value of the plant was shown to be $891,502; the profit and loss account of the concern showed $69,928; operating and general expenses, $161,483, as against $137,723 for the preceding year; and the income in 1915 was $290,450, as against $264,095 in 1914. The capital stock permitted at this time is $750,000, of which $615,570 is issued. All of this is fully paid up and none of it has been issued in stock dividends. There are bonds outstanding amounting to $260,000. The trial balance showed a total of $1,100,752.

During the course of the examination it developed that the country system and electric clocks and fire alarms were not paying by several hundred dollars a year. It was intimated that while there was no intention on the part of the company to raise the tariff of the city telephones, it was possible that the rate for the country service might be advanced to take care of the loss occurring each year.

Extensions were being made from time to time as additional subscribers demanded service, and there are at present about 7,000 instruments installed and in service in Honolulu and the island of Oahu, of which 1,400 are in the business section of the city and the balance in the residence and country districts.

There are 154 employees of the company, of whom 41 are women. The latter are operators in the Honolulu offices and country exchanges and get $20 to $55 per month, according to efficiency and length of service. The mechanical department pays from $1.50 a day for helpers to $4.50 to the linemen.

Construction work is going on all the time and this year it is possible that about $80,000 will be spent in extensions and replacements. A new station to take care of the Waikiki and Kaimuku subscribers is being constructed at a cost of about $7,000 for the building alone.

In the country districts the operators are supplied with everything except their food; the company furnishes sleeping and living quarters, kitchen utensils, and table and bed linen.

Radio Experiments in the Navy

It is learned that radio telephone experiments have been conducted during the winter maneuvers of the Atlantic fleet off Cuba. For the purpose wireless telephones have been installed on the "Wyoming," Admiral Fletcher's flagship, and on the "Texas." These instruments have been used in sending messages to other units of the fleet, which, while not equipped with radio telephone apparatus, have been able to receive the messages with their wireless telegraph receiving sets. It appears that the transmitters are based on the results of the American Telephone & Telegraph Company's successful radio telephone experiments.

Problems of Inductive Interference

Presented at a Joint Meeting of A. I. E. E. and N. E. L. A., Portland, Oregon

BY A. H. GRISWOLD, L. P. FERRIS, R. W. MASTICK

INDUCTIVE interference may be defined as the resulting interruption or impairment of service over a communication circuit exposed to the influence of the varying electric and magnetic fields surrounding a neighboring power circuit. Exposure arises from colineally constructed lines constituting what is generally termed a "parallel" or case of "parallelism."

In the above definition of inductive interference, communication and power circuits are both used in a general sense, communication circuit meaning any circuit used for the transmission of intelligence and power circuit including all circuits transmitting relatively large amounts of energy in comparison with the communication circuit. For the purpose of this paper, which is to present certain aspects of this subject for your consideration, the field covered by the above definition has been narrowed so as to include only metallic telephone circuits and power transmission circuits. Even with this limitation, it will be impossible within the scope of this brief paper to do more than touch upon the important features of this problem.

Transient interruptions of service occur in most instances of parallelism between power and telephone circuits, and continuous impairment of service to a large or small extent, is to be expected, unless adequate precautions are observed.

Interruption of service due to the effects of normal steady state operation of a power circuit occurs only under severe or acute conditions. Transient interruptions to service are caused in most instances by such abnormal conditions on the power circuit, as grounds, short-circuits or open-circuits, which largely unbalance the system. In some instances, transient interruptions are produced by such normal operations as switching and the charging of electrolytic lightning arresters. The severe inductive effects resulting from transient disturbances in a power system are ofttimes the cause of personal injury to telephone operators and occasionally to subscribers and telephone linemen. In most instances, the injury of operators is due directly to what is familiarly nown as a "bat in the ear." In extreme cases, operators have been thus disabled for a period of four months. Aside from personal injury, service is sometimes demoralized by such occurrences which naturally make the operators nervous in performing their duties.

In cases where the disturbance is sufficiently severe to operate the protective devices on the telephone circuits, considerable loss of circuit time is experienced, due to the necessity of replacing the protective apparatus which is generally "blown" simultaneously on a number of circuits and at offices widely remote from the seat of the disturbance.

Abundant statistics are available to show the seriousness of such transient disturbances, but it is desired here merely to call attention to this situation, the seriousness of which will undoubtedly be appreciated without the necessity of burdening this brief paper with statistics.

The remedial measures to prevent such interruptions and damage consist essentially in large factors of safety in the construction of the power circuit apparatus, and careful maintenance and opertion. In cases where line faults develop, the method of location should be arranged in such manner that the fault itself is not energized repeatedly in the process of location, as each time this is done a severe disturbance is liable to be created in neighboring communication circuits. Where possible, switching should be done on the low-tension side of transformers, and the several poles of the switches mechanically interconnected so as to avoid as far as possible momentary unbalancing of the circuit.

Some methods of charging electrolytic lightning arresters give rise to more severe transient disturbances than others. Charging resistances and the method suggested by the General Electric Company, in the *General Electric Review* for January, 1913, are recommended. The time of charging arresters can often be arranged for a period when the telephone circuits are least liable to be in use.

Apparently there are no preventive measures which may be employed which will entirely obviate transient interruptions to telephone service where such circuits are paralleled for considerable distances by power circuits.

A continuous impairment of service may result from practically all parallels, due to the normal operating conditions on the power system, unless adequate precautions are taken to the contrary. Such impairment of service is due to the induced currents in the telephone circuits which manifest themselves as noises in the telephone receivers at the terminals of the circuits. You are all familiar with the humming or singing noise heard on telephone circuits subject to induction, and most telephone circuits on the Pacific Coast are unfortunately so subject to a more or less extent. This impairment of service due to noise is termed continuous, as it continues at all times while the power circuit is in normal operation. The effect of the noise is to decrease the intelligibility of conversation over the affected circuits, thus decreasing their efficiency.

The chief factors which are to be considered in judging the severity of the induction which may be caused by a parallel are:

1. Length of parallel.
2. Separation between circuits.
3. Spacings of conductors of power circuit and of telephone circuit.
4. Configuration of circuits.
5. The magnitude, frequency, and character (whether balanced or residual) of the fundamental and harmonic currents and voltages of the power circuit.
6. Unbalance of power circuit (producing residual voltages and currents).
7. Unbalance of telephone circuits.

The currents and voltages of the power circuit, including harmonics as well as fundamental, may be resolved into what are termed balanced and residual components. Briefly the former are balanced with respect to the earth as a point of reference, the bal-

anced currents, for instance, being confined in the case of a three-phase circuit to the three line conductors and excluded from the earth. In the case of residual components the power circuit as a whole is raised above ground potential, the ground thus forming one side of the circuit, therefore the power circuit is for residuals equivalent to a ground-return single-phase circuit. It should be almost obvious that the inductive effects of residual voltages and currents are proportionately greater than the inductive effects of balanced voltages and currents.

In regard to remedial measures to prevent impairment to service over telephone circuits due to the normal operation of power systems the most obviously effective and desirable method is to avoid or eliminate the parallel. That parallels cannot always be avoided or eliminated is recognized by all concerned. With the recognition of this fact we are confronted with the problem of so constructing and operating parallel telephone and power circuits that each industry may be unhindered in its development and extension of its network of circuits for the benefit of the public.

It is perhaps fortunate and significant that substantially all interference and impairment of service arises from factors which are non-essential to the practical operation of power circuits. These non-essential factors are the residual voltages and currents, fundamental as well as harmonics, and the harmonics of the blanced voltages and currents. The balanced voltages and currents of fundamental frequency, which perform the useful functions of the power system, cause little damage to parallel telephone circuits and this little can be easily prevented by simple measures. Not only are the factors which are the most damaging to neighboring telephone circuits non-essential to the power circuits but they sometimes cause trouble to the power circuits themselves. Under these conditions it is but just and proper that power companies make reasonable efforts to eliminate these non-essential factors which are so troublesome to their neighbors.

The basic cause of noise in telephone circuits subject to induction is the presence of harmonic currents and voltages in the power circuits. Were it not for the irregularities of wave-form of the power circuit voltages and currents there would be practically no noise disturbances due to the vast majority of existing parallels.

Tests have conclusively demonstrated that the detrimental effect of a given amount of extraneous current in a telephone receiver increases very rapidly with the frequency (approximately as the square) up to about 800 cycles per second, beyond which the detrimental effect decreases very gradually. This increase in the detrimental effect with an increase in the frequency of the extraneous current is very largely a physiological phenomena and the relative detrimental effects of equal amounts of extraneous currents of different frequencies may be termed the physiological factor for the weighting of different harmonics in accordance with their power of interference. It is convenient in weighting all the harmonics to use the fundamental as a basis of reference. There are a number of factors which must be considered in linking the telephone receiver to the generator of the distant power station. Some of these factors are: (1) telephone terminal apparatus factor, (2) telephone line factor, (3) induction factor, linking telephone and power circuits, and (4) power circuit factor. The product of all these factors and the physiological factor will give the relative weights, from the standpoint of inductive interference, which should be assigned to the different harmonics originating in the generator. All of these factors are not accurately known but the net result is undoubtedly to increase the importance of the higher harmonics above that assigned to them by the physiological factor alone. For the purpose of this paper these considerations merely show the great importance of efforts to improve the wave-form of alternating current machinery. The attainment in commercial service of pure sine waves is not to be regarded as practicable. However, it is perfectly feasible to better conditions in this respect in new electrical machinery by a due regard to the details of design which determine the magnitude and order of harmonics produced by rotating machines. It is no criticism of the designers that such has not been the case in the past for the importance of such efforts has not perhaps been sufficiently recognized. Much will be accomplished in this direction if users of apparatus impress upon the manufacturers the importance of improving wave-form, especially as material improvements can in many cases be made at a very small expense. Distortion of wave-form with the consequent introduction of harmonics is inherent with the use of iron-core transformers. The importance of transformers as sources of harmonics is chiefly with respect to triple harmonic residuals introduced by grounded star-connected transformers.

With respect to residuals power circuits fall naturally into two general classes:

1. Circuits operated with a grounded neutral or neutrals.

2. Circuits isolated from ground, that is, normally having no metallic connection to ground at any point.

For the first class of circuits the causes of residuals are:

1. The triple harmonic voltages and currents from grounded star-connected transformer banks.

2. Unbalanced loads to neutral.

3. Capacitance unbalance of the several phases of the circuit.

For grounded-neutral systems the characteristic triple-harmonic residuals are most troublesome and difficult to prevent or minimize. Their magnitude is determined very largely by the type of transformer connections and the magnetic density of the transformer iron. Low magnetic density and the delta-star connection of single-phase units or three-phase core-type transformers are to be recommended in preference to high magnetic density and the star-star connection of single-phase units. Observance of these precautions is, however, no guarantee that harmful interference may not result in cases of severe exposure. The effect of the lines and the interaction of banks of transformers at different points of a large grounded neutral network present a complicated problem, the detailed discussion of which has no place in this paper.

To prevent residuals due to unbalanced load careful attention should be given to the distribution of load upon the several phases and in no case should grounded single-phase loads be permitted.

Capacitance unbalance is generally of minor importance in giving rise to residuals in grounded neutral circuits. Should its effect be of importance it can, however, be cared for by transposing the power circuit.

Residual voltages and currents in isolated power

systems arise from unbalanced capacitance and conductance between the several phases of the circuit and ground. In well maintained power circuits the effect of unbalanced leakage is of minor importance. In an isolated power circuit the voltages to ground are determined by the voltages between conductors and the capacitances between the several conductors and ground. If the latter are unbalanced the voltages to ground will be unbalanced, that is, they will not sum up to zero and if different sections of line are not similarly unbalanced a residual current will be caused. The unbalanced capacitance of a power circuit can be reduced to a negligible amount by transposing the power circuit in such a manner that each conductor occupies each of the conductor positions for equal distances. In other words, a whole number of "barrels" must be installed. The length of "barrel" necessary to effectively balance the circuit is dependent upon the frequency of the prominent harmonics of the impressed voltages, since it is chiefly desirable to guard against the harmonic residuals.

In all cases of parallelism the power and telephone circuits should be rendered as nearly as practicable mutually non-inductive by the installation of coordinated transposition systems upon which reliance is placed to prevent troublesome interference from the disturbing factors of the power circuit which it is not possible to eliminate.

Each side of a telephone circuit subject to induction is raised above the potential of the ground which must be in the case of telephone as well as power circuits, the true basis of reference. The disturbing current in the telephone circuit is due to the differential inductive effect between the two sides of the circuit. Transpositions in the power circuit reduce the induction from balanced voltages and currents by creating mutually neutralizing inductive effects in neighboring lengths of each side of the telephone circuit. They do not affect the induction from residuals since they do not in reality constitute a transposition of the two sides of the residual circuit. Transpositions in the telephone circuit tend merely to equalize the induction in the two sides of the circuit, whether from balanced or residual components, by exposing each side equally to the effect of the power circuit. Where both power and telephone circuit transpositions are employed the effectiveness of this equalizing depends, with respect to the balanced components, upon the relative location of the power and telephone transpositions and it is for this reason that careful coordination of transpositions in the two types of circuit is essential to the success of the method.

The effective application of coordinated transposition systems to the power and telephone circuits involved in a parallel generally requires power circuit "barrels" of from one-half mile to six miles in length, the former figure being exceptional. The number of power transpositions required is very largely determined by the length of reasonably uniform sections of parallel between points of discontinuity such as ends of parallel, crossovers, substations, loading points and branch loads. In regard to the telephone transpositions, it is generally necessary to completely retranspose the telephone circuits within the limits of the parallel and beyond each end of the parallel to the nearest neutral point in the transposition system. The development of a special system of telephone transpositions has been necessitated by the double requirement of rendering the telephone circuits non-inductive to the power circuit and to each other.

Considering some of the other factors which determine the severity of induction to be experienced in any given case, it is obviously desirable that the separation between circuits be as great as possible. It is also highly desirable that the separation between circuits be as uniform as possible in order that the effectiveness of transpositions may not be seriously impaired. The spacing of the conductors of the power circuit and telephone circuit is important in determining the magnitude of the inductive effects. The conductors of each circuit should be as close together as practicable in order to minimize the induction. The spacing of the telephone conductors employed in practice is now as small as possible, considered with proper maintenance and operation of the circuits. Cases have occurred in which the spacings of the conductors of the power circuit were greatly in excess of anything demanded by the mechanical or electrical requirements of the situation.

The configuration of the circuits, meaning the relative positions of the different conductors, is a large factor in determining the magnitude of the induction per unit length of exposure. The configuration of telephone circuits is practically fixed and uniform, but, on the other hand, there is some choice with respect to the arrangement of the power conductors. Power engineers have indicated their willingness and desire where possible to adopt a configuration which will give the minimum of induction. Unfortunately, however, the available knowledge as to the best type of configuration and the relative merits of different practical configurations, is very limited.

The unbalance of a power circuit in producing residual voltage and current has been mentioned before. The unbalance of the telephone circuits themselves is of considerable importance in determining the noise in circuits subject to induction. When a telephone circuit as a whole is raised above ground potential, any unbalance of the circuit tends to cause a current through the terminal apparatus, thereby causing noise. The efforts of the telephone companies since the introduction of metallic telephone circuits have been to steadily improve the balance of their circuits until today little practical benefit in the way of noise reduction can be obtained through efforts in this direction. It should be borne in mind that the requirements of telephone circuit operation, entirely apart from the matter of interference by power circuits, necessitate a very high degree of balance in order to prevent mutual interference between the large number of closely associated telephone circuits on the same pole line.

The fact that power circuit transpositions do not reduce the average induction from residuals into the two sides of a circuit, coupled with the fact that a small voltage to ground may produce harmful interference, even with the high degree of balance attained in telephone circuits, renders it important that an effort be made to attain a similar high degree of balance of power circuits, i.e., the reduction of the residual voltages and currents.

Recent developments in California in regard to the inductive interference situation are of present interest. Owing to the spirit of co-operation between the power and telephone companies due to the work of the joint Committee on Inductive Interference and the adoption

by the Railroad Commission of California of the committee's recommendations for rules to mitigate inductive interference; many important induction cases have already been settled amicably and in a manner entirely satisfactory to both parties. The chief benefit of the California rules is perhaps not so much in the rules themselves as in the spirit of co-operation and mutual understanding which has developed as a result of the investigation upon which the California rules are based. It is this spirit of co-operation that should be encouraged between all power and telephone companies, and in which they should meet to overcome the difficulties growing out of inductive interference and adopt remedial measures for the most economic solution of the problem, all things considered, regardless of whether the most extensive changes are necessitated in the system of the power company, or of the telephone company and allowing the division of the costs to be made independently and solely with regard to the equities of the situation.

The Buffalo Situation

Recent conferences in Buffalo between officials of the New York and Federal Telephone Companies are believed to mark the opening of a vigorous campaign to effect a merger of telephone systems in Rochester as well as in Buffalo.

A definite announcement declaring the two interests in accord is lacking at present; but it is believed that some sort of an understanding has been reached and that the so-called negotiations through the medium of the Buffalo Chamber of Commerce have been undertaken chiefly for the purpose of stimulating public interest in the project.

Both George R. Fuller, president of the Rochester Telephone Company, and William J. O'Hea, Rochester district manager of the New York Telephone Company, said that they had not been informed officially of the character of the Buffalo conferences.

"The position which the New York Telephone Company shall take toward the suggested merger of the two telephone companies operating in Rochester," Mr. O'Hea said, "will depend solely upon the attitude of the public toward the merger. While the continued extension of duplicate telephone lines in the growing cities of Rochester and Buffalo can mean nothing other than wasted capital, which must, in the end, bring losses to the communities, there are many difficulties in the way of bringing about a consolidation.

"These difficulties cannot be surmounted by the companies; they must be cleared away by public sentiment. The Public Service Commission of the state has full jurisdiction over rates, service, capital expenditures, etc., and if a merger is brought about the affairs of the company left in the field will be subject to state supervision."

Mr. Fuller practically repeated Mr. O'Hea's statement and added that he hoped telephone users would express their opinion of a single system. It is believed that an opportunity will be afforded them soon, possibly through the Rochester Chamber of Commerce.

The fact that the Federal Telephone and Telegraph Company is a heavy stockholder in the Rochester Telephone Company is sufficient evidence, it is said, that Rochester is considered equally with Buffalo in the merger plans. In fact, there is talk of an agreement whereby the New York Telephone Company would absorb the Independent company in Buffalo and be absorbed by the Rochester Telephone Company in this city. Toll lines would be disposed of in similar fashion.

Precedent for such an arrangement was established two months ago when the Independent telephone company in Penn Yan absorbed the Bell properties and the Bell absorbed the Independent's in Cortland.

Mr. Fuller and Mr. O'Hea were asked what would be the effect of consolidation upon the telephone rates.

"It would have the effect of increasing them somewhat," Mr. Fuller said. "Just how much, however, would have to be decided by the Public Service Commission. The company would have nothing to do with it."

B. G. Hubbell, president of the Federal Telephone Company, has stated that telephone users of the city will vote on the proposed merger, when the report is ready to be submitted to the public. The members of the telephone committee of the Chamber of Commerce presented their report to the board of directors of the chamber. A tentative rate schedule will also be submitted to the public for consideration. Blanks for the purpose of voting on the subject will be submitted to telephone users of both companies.

The Riverside Business Men and Residents' Association has adopted resolutions calling upon the telephone companies to furnish proof of continued good service and reasonable rates before any attempt at consolidation of the two companies is considered.

Hearing in State of Washington Finished

The Washington State Public Service Commission on March 20 finished its hearing relative to the physical valuation of the properties in the state of Washington of the Pacific Telephone & Telegraph Company, which maintains head offices in San Francisco. The hearing was begun in Tacoma, January 17. Findings on the valuation are not anticipated for several months, due to the mass of data involved. Chairman Reynolds announces the commission will begin its rate hearing on May 21 at Olympia, and at this time the commission will consider the segregation of properties used for local and toll service in the large cities of the state. The commission will also consider the question of discrimination, and of switching rates on farmer lines. The Pacific Telephone & Telegraph Company contends for a valuation based on the cost of reproduction of approximately $19,000,000. The figures of the commission are estimated at a total of about $16,000,000. It is stated the commission's figures are deceptive, inasmuch as they do not include such items as development, costs, taxes, interest during construction, and items which the company includes in its units costs.

Changes in Standard's Branch Office Locations

The Standard Underground Cable Company announces the following changes in the locations of several of its branch offices:

The Chicago office is now located in the Conway building, having on May 1 moved from the Rookery, where it was located for many years. The Detroit office has moved from the Free Press building to the Whitney building. A new office will shortly be opened in Minneapolis, Minn., in charge of W. J. Weld.

In the Pacific Coast department the Portland, Ore., office has been discontinued and a new office opened in the Newhouse building, Salt Lake City, Utah, in charge of F. W. Wilson.

The Golden Lure

The Monopolists Still Work for the Destruction of the Independents

BY TERRY W. ALLEN

BEFORE me is a letter that I received from an Independent telephone man, which is in part as follows:

April 3, 1916.

Since the consolidation scheme failed a local attorney here has been trying to buy our exchange at High Point. He frankly states that his client is not the Bell Company, but that he does not know what the party wishes to do with the exchange. He has offered $100,000 for the property, and has persistently urged me to make a price on my stock, but I have refused to offer my stock for sale. I hardly think he will purchase a minority of the stock.

Very shortly after the receipt of this letter, in fact, April 17, I received a notice from the Department of Justice through F. B. MacKinnon of Washington, D. C., that a consolidation is to go through at the point mentioned in this letter. In other words, in this case, where a man had fought consistently, honestly and openly against a consolidation and had practically won this fight, all the time before him was the glittering offer of an attorney to buy his stock. You will notice in this letter that he says the lawyer claims his client was not the Bell company; but, nevertheless, to my mind, since the consolidation has been proposed, it must have been some one closely related with the Bell interests.

In the famous commitment of the American Telephone & Telegraph Company the statement appears that "Neither the American Telephone & Telegraph Company nor any other company in the Bell System will hereafter acquire, directly or indirectly, through purchase of its physical property or of its securities or otherwise." Yet here, to my mind, although the details of this merger have not been made public, is a case where the surreptitious offer of the Bell Company could not be withstood.

We have come to a pass in this telephone game where the Bell company is using every means in its power to hinder, to blind and to detract from the prestige of the Independent telephone companies. Who can say but that these purchases by Independent companies of the Bell system may not be carried on by a branch of the Bell financial agents for the purpose of turning these companies over at the very first opportunity to the parent Bell company? Who can say but that it is another one of the indirect methods of acquiring a nation-wide monopoly? It is said that money will do anything, that almost everybody has his price. As long as such conditions exist in the minds of Independent operators, all they have to do is to make it known either directly or indirectly to the Bell company that they are ready and willing to sell out, and some agent, either directly or indirectly representing the Bell financial department, comes and holds such an offer as indicated in this letter before their eyes. When troubles come and storms or fires or other conditions cut down for a little while the profits of an Independent company, the board of directors of that company, naturally feeling that the offer is sufficient, and usually more than sufficient, throw up the white flag and capitulate to the monopoly.

While this country is going through serious foreign complications, while the government of the United States and the minds of the people generally are focused upon foreign conditions, while the front page of the newspapers contains little domestic information, but largely controversies between the nations of the world, the public's mind is taken for the time being from the conditions that obtain in this country. The New York, New Haven and Hartford matter has been obscured. The Standard Oil and other cases are being quickly forgotten, and were it not for the excessive price of gasoline we would never know that the Standard Oil Company had ever been before the bar of justice. Consequently the American Telephone & Telegraph Company, believing that the public's mind is obscured, that its acts will not receive a place in the public press on account of subsidized newspapers and magazines, is, to use the old expression, "making hay while the sun shines." The federal government has been more than lenient with the Bell company. It has allowed it to evade the 1913 commitment, and the Independent operators have not evoked the Sherman Anti-Trust Law or the Clayton Anti-Trust Law to their aid. Consequently these conditions have been going on and with each week the American Telephone & Telegraph Company becomes bolder in its practices of gaining a nation-wide monopoly.

In Chicago, on the 22nd, I tried hard to get into the newspapers a notice of the fact that the United States Independent Telephone Association was to meet and discuss the question of mergers, a question that is prominent before Chicago on account of the sale of the Illinois Tunnel Company to the Bell System. I tried to get reporters from the different papers to give this matter some publicity, but was not able to get a single, solitary line in the newspapers of Chicago. There seems to be a concerted effort on the part of the Bell company to keep publicity from being given to its acts in large centers. At none of the national Independent conventions, with the exception of one held at Minneapolis, have we received a line of publicity. The Bell Telephone Company has its claws deeply imbedded in the tender flesh of the American press.

How long are such conditions to be put up with? How long is the government of the United States going to allow the insidious encroachments of the American Telephone & Telegraph Company upon Independent telephone operators and manufacturers?

It appears to me that we have wasted too much time. We have said too little; we have done too little; we have been too docile; we have bowed to the cry of "wait." Something is going to be done. The Bell Telephone Company is going to allow us certain rights. You can rest assured that you can get no rights that you do not fight for. You can rest assured that you are going to be given nothing from the greedy hands of the American Telephone & Telegraph Company that you do not wrest from them. The Bell people have talked about giving us toll connections upon an equitable basis. This they have never done, and if we get an equitable toll contract it will not be magnanimously from the American Telephone & Telegraph Company, but will have to be forced from it.

Have you noticed in the Bell company's report how 4½ per cent of gross earnings are levied upon each subsidiary company to help maintain the American Tele-

phone & Telegraph Company's stock at 128? Is there any other industry in the country that would stand for this kind of taxation for a seeming advantage that does not in reality exist? Could any other public service corporation get by on this kind of a settlement? Will the monopolists force the temple down upon their own heads? To my mind the walls are already shaky and the foundations are being loosened. It will not need a Samson to pull down the pillars. It behooves the Independent telephone operators to be awake, to watch the conditions and the times to get publicity where it is needed and to strike out with a bold stroke for the rights of competition.

Governor Dunne Talks on Utilities

The operation of the state public utilities act, with special reference of the law's relation to telephone systems in Illinois, was explained by Governor Dunne, who talked to members of the Central Union Telephone Company Employes' Club recently. All the employes who could be relieved from duty were present to hear the governor.

The governor explained the unsatisfactory condition of public service that formerly existed and the effect of the public utility enactment of the forty-eighth general assembly. Governor Dunne has been interested in public utilities problems for a great many years, and recommended the creation of the public utilities commission in his inaugural address. The governor stated in part:

"Important as it is to give cities the right to manage their own public utilities, it is also important to give to state and local bodies large powers of regulation of the public utilities that remain in private hands.

"These utilities may be broadly classed as 'intraurban' and 'interurban.' In other words, they are either local in character, confined to a city and its suburbs, or they run through country districts and connect one place with another.

"In the latter class are included interurban electric railways, natural gas mains, electric transmission lines, and a considerable portion of the telephone systems of the state.

"In the other class are included city gas, electric light and power, heating, and street railway companies, and such parts of the telephone system as are operated within cities by virtue of franchises granted by such cities. Waterworks in private hands, and doubtless some other public utilities, could be included in this class."

The beneficent effects of the utilities act and how the amount of fees paid into the state treasury for authorities granted more than paid the expenses of the commission, the governor said in quoting from his biennial message:

"Because the public utilities commission has had to maintain a large organization, and because substantial salaries had to be paid members and employes of the commission, and seemingly large appropriations have been made by the legislature, it might be thought that the commission was a burden upon the state's finances and tended to add to the tax burden. Such, however, is not the case. Since its organization the commission has been a source of net revenue to the state.

The receipts of the State Public Utilities Commission of Illinois from January 1, 1914, the date of its beginning, to February 29, 1916, a period of twenty-six months, amounted to $835,690.69. The grand total of expenditures for the same period amounted to $514,-133.82. This leaves $321,556.87 which has been paid into the state treasury through the commission, over and above all expenses.

"For the year covered by the second annual report of the commission, dating from December 1, 1914, to November 30, 1915, the receipts were $634,789.21 and the expenditures $265,366.05, leaving a balance of $369,-423.16 for the twelve months."

In regard to the public utilities commission and telephones, the governor said:

"With respect to the telephone situation, as it now exists in this state, I am informed by the state public utilities commission that there are 796 new telephone companies reporting to the commission and under its supervision. These companies operate a total of 1,306 exchanges. The telephone has become practically indispensable to the business and social life of the day. As compared with the number of telephone companies reporting to the commission, there are 174 electric light and power companies serving a total of 650 cities and villages; there are 71 gas companies serving 216 cities and villages; and there are 53 railway companies serving 72 localities.

"One of the first acts of the commission after its organization was to require all telephone companies as well as other public utilities, to file with the commission complete schedules showing the rates and charges of such public utilities. From the schedules thus filed, it appeared that many telephone companies, as well as other utilities, were furnishing free or at reduced rates service not only to municipalities, counties and other political units, but also to railroads, express and telegraph companies, public halls, halls, lodge rooms and in many instances to individuals. It also appeared that many telephone companies made it a practice to furnish telephone service free or at reduced rates to their stockholders and directors. This practice was carried on to such extent in some cases that only a comparatively few subscribers were paying the regular scheduled rate.

"Under the law, the public utilities commission has, in every case where discriminations as to free service has been found to exist, abolished the practice. By conference rulings, the commission directed that all public service companies should abolish discriminations as to rates and service, to the end that every customer should receive the same treatment."

Invention for Removing Solder and Tin

Vice Consul Hamilton C. Claiborne, Swansea, Wales, reports that among the recent patents filed in England is the process for removing the solder, tin, and chemicals from scrap and galvanized articles and for utilizing the base metals. The inventor is a South Wales tin-plate worker, who has already secured contracts from several municipalities for treating down refuse such as tin cans, containers, and similar metallic waste products.

Formerly large quantities of old tins were taken by continental dealers practically at the cost of carriage to be utilized in manufacturing cheap articles such as toy soldiers, novelties, mechanical toys, and a large assortment of nondescript articles usually found in penny bazaars, etc. The usual processes in manufacturing such goods only necessitated a simple cutting or stamping and a light coating of enamel or paint.

Keystone Telephone Competition

Addressed to Employes of the Keystone Telephone System and Equally Good for Others

BY EDWARD M. COOKE

Edward M. Cooke.

WITH the exception of one month at the time of the outbreak of the great European war, the Keystone Telephone Company, from its inception, has shown a steady monthly, as well as yearly, upward progress in the number of telephone stations in its system. While the gain in stations in the first three months of 1915 was good, the gain in the first three months of the present year was more than 200 per cent greater. Still I am not satisfied. It seems to me that we should go ahead more rapidly. The whole trouble is that the truth about the efficiency and the economy of our telephone is still unknown to many people. Wherever it becomes known, there we gain subscribers. Now how shall we get this truth into the minds of all those who don't know about it? We can only do that by aggressive educational work. The most effective instrument at our command for that task is the little army of people who are employed by the company. This does not mean salesmen alone, but every one who works for us in any capacity. There are one thousand of us, and if we have before us the whole truth in convenient form, and individually spread it wherever we go, think what an effective medium for education it would prove. Some months ago, in a letter, I called attention to certain features of telephone competition here and elsewhere. That letter was distributed among our people and used effectively by them. At this time, I should like to add some thoughts thereto. These are not all new facts, but it should be our constant endeavor to so marshal and present the points in the case of the Keystone telephone that they can be readily referred to and the truth thus generally and authoritatively shown to the public.

THE ENGINEER'S ADVICE.

A well-known telephone engineer from the west spent some days recently examining the Keystone telephone plant and the methods of operation. When he was about to return home, he was asked to criticise what he had seen. He said: "My chief criticism of your organization is that you spend too much time and money on complaints from subscribers. You take them too seriously, and, as a result, they cost you proportionately two or three times what they cost any other telephone company I know. Don't forget that a lot of complaints in any business are groundless. That is much more apt to be true in the telephone industry than any other. In many cases, these complaints are the result of the subscribers' bad nerves or ill temper or impatience or some other element that is incurable on your part. You can't alter human nature with a screw driver, and you may as well avoid the expense of trying to do so. If you will just let the complaining subscriber alone for a few hours, the complaint will usually either cure itself or be forgotten. Don't send anybody out on the case, at least until you hear from it a second time."

Notwithstanding that engineer's opinion, our method we believe to be the only up to the minute way of handling complaints. We invariably speedily respond to all complaints and promptly adjust them. It takes a lot of time and money and a large corps of inspectors to do that, but we do it just the same. It not only brings to us the pleasurable pride inevitably felt in work well done, but it pays cash dividends in increased patronage. The telephone is an exceedingly delicate mechanism, but it is our business to see that it works. Into its operation the human element enters largely, but so far as the employes of the company are concerned, it is our mission to see that prompt, efficient and courteous service is rendered. So the moment we get a complaint, some one is assigned to investigate. If it is our mechanism or our operators that are at fault, we correct it promptly. If it is necessary to put in new equipment or a new operator, that is done. The result is that we are confident that we give the best telephone service in the world.

BEFORE AND AFTER.

The Keystone telephone system began operations in 1902. Prior to that time there were some 12,000 telephone stations in Philadelphia. Those 12,000 were the trivial accumulation of twenty-one years without competition. Any one who wanted a telephone in those days had to live in just the right street, meet just the unalluring conditions offered, submit to indifferent service, and pay the price demanded. Naturally there were only a scattering few subscribers and those who did have telephones could not reach most of the people they wanted to communicate with. They had to transact their business usually by the slower method of personal visit or by messenger or by mail.

Then came the Keystone Company with its healthy and inspiring competition. The unlimited service dropped from $160 per year to $90. Subscribers were eagerly sought in all directions. No matter where they lived, within reason, having a telephone was made easy for them. Pay station calls were reduced from 10 cents to 5 cents. The cost of calls to Camden was similarly cut in half. The average price on measured service per message had been 8 cents. Its upper cost limit on the Keystone was 5 cents. We inaugurated the then brand new scheme of furnishing each measured service subscriber with his own meter. That enabled him to keep his own record of calls and did away with the unnecessary disputes about the count. The former average cost of all classes of telephone service was over $100 per year. The Keystone was less than $50. Underground conduits were then scarcely used. But the Keystone Company gridironed

the city with its subways, and overhead wires disappeared in all directions. Competition brought about a revolution in service. Efficiency was the watchword. Courtesy to the people was a necessity. The public became the boss instead of the operating company.

The material and evident result of all this was wonderful. Both telephone systems grew like well-watered vines beneath the warm spring sunshine. In the fourteen years that have followed, 160,000 telephones came to Philadelphia. Just think of it—12,000 in the twenty-one years before 1902, with a single service, and 160,000 in the fourteen years after 1902, with two companies straining every nerve to get new business. That is the stimulating and healthful effect of competition.

THE SAME RESULTS ELSEWHERE.

Elsewhere we find the same story about the results of telephone competition as in Philadelphia and other communities served by the Keystone System. The Committee on Post Office and Post Roads of the National House of Representatives last year was investigating the telephone question. Many public hearings were had. At one of these, on January 15, a witness testified as follows:

"I have a list of 60 cities in the United States. In many of them competition prevails; in some of them it does not. The result as shown in that table is that 24 cities, averaging 342,486 in population, pay an average rate of $53 under competition, while the remaining 36 cities, averaging 188,629 in population, without competition, pay $81."

That is eloquent testimony. Competition is a necessity because human nature is what it is. Without the fear of our competing fellow man, we are sure to be inefficient and high-priced and generally unruly. With competition standing guard over us, we are afraid to be anything but our best. That is true in every field of human effort. It is just as true in the telephone industry as it is in any other. There is no symptom of cut-throat methods about telephone competition in Philadelphia. Both companies thrive as they live. Both of them make money and each one is better in service and general conduct because of the honest rivalry between them. The Keystone Telephone Company has accumulated a handsome surplus and reserve for the renewal of its plant amounting to $2,311,762. The total net profits from operation last year were $361,013. Out of this was paid the regular 6 per cent dividend on the preferred stock and an additional 4 per cent on the cumulative account, leaving a safe margin for proper additions to the reserves. The distribution of profits, as well as the interest on the bond issue is, of course, made largely among home people, for most of the securities of the company are held in Philadelphia and vicinity. The excellent financial showing of the company marks indubitably the confidence of the people in the useful mission of the Keystone System.

THE TWO TELEPHONE HIGHWAYS.

The ice-bound igloo of the Eskimo and the sun-baked mud hut of the South Sea Islands' savage are constructed without windows and with a single tiny door. Such homes do very well for the restricted life of their simple-minded and humble owners. But the modern business man of civilization and big, broad ideas must go to the other extreme. He wants a lot of entrances to his business home. He wants plenty of light and fresh air and plenty of windows and plenty of elevators and plenty of delivery wagons and lots of telephones. The success of his activities depends on the abundance of his facilities. You never hear him talk about the alleged nuisance of two telephones. Two telephones mean to him no more trouble than two railroads or two highways of any kind. They are, in fact, purely and simply, necessary highways of thought and speech to and from his business house. They bring orders to him. They bring help for today and hope for tomorrow. They bring money to him. Why should he lock and bar one of his telephone entrances any more than he would shut one of his doors in the faces of those who come to buy from him? He could well afford to pay a handsome premium in order to enjoy the advantages of the two lines. But as a matter of fact, in Philadelphia, he can have both services at less than the cost of one in other cities where there is no competition. With the two services he reduces to the minimum the possibility of ever being cut off from communication with those he desires to reach, or those who wish to communicate with him. He practically eliminates the "wire busy" interruption to the flow of calls outward and inward.

THE THOUSANDS OF DAILY USERS.

The fact that there are over 1,200 private branch exchanges in our system covering practically all the great commercial and industrial plants of the city speaks eloquently of the business man's judgment as to our service. These are the large users and must have the best and the most economical. Once each month we make an accurate count of every message passing over Keystone lines. Last month's one day record was 195,000 messages. That means that twice that number of people, or 390,000, daily use Keystone telephones. It is unthinkable that any alert manager of a business enterprise can look at those figures and allow himself to be disconnected for a single day from that main highway of commerce talk.

The man who does not have a Keystone telephone is, in fact, telling the customer who has our unlimited service that this customer must pay for the privilege of going into his business home to buy. He virtually tells this customer that the free door is locked, but that if that customer desires to enter, he can pass around to the measured service door, where, by paying a fee, he will be admitted. The foolish man spends thousands in advertising and inviting business, and then when the prospective purchaser arrives, he is charged admission for the privilege of buying.

THE PREPONDERANCE OF TRAFFIC.

More than sixty per cent of the business messages of the community pass over Keystone lines now. In some divisions of the business world, the percentage is much higher than that. A notable case is that of the financial houses. Something more than eighty per cent of the telephone traffic in the local financial world is carried by the Keystone system. The fact that ours is the official telephone of the Stock Exchange contributes largely to that end. But there are other reasons. That the service is unlimited, with the attendant reduction in telephone cost, is a main consideration. Then, too, our service is faster than the other. The City Electrical Bureau made, without our knowledge, a convincing test of this. The annual report of that bureau, issued last year, showed that ours was almost twice as rapid as the other. The exact figures were an average of 3.7 seconds to reach the Bureau over our lines and 6.9 seconds over the other company's wires.

Then the transmission is better, due to the special character of the instrument and the size of the wires used. With the stock broker and banker, whose hours of active operation are more limited than others, two telephones are positive helps rather than hindrances. He uses them as easily as he uses two call bells or two messengers. He gets quick action through them. But while it is the busy business man who chiefly uses the Keystone wires, they are in constant demand for a wide range of other purposes. More than seven thousand people daily ask our operators, "What time is it?" At the climax of the baseball season last year nearly twelve thousand enthusiastic fans passed over our lines daily the question, "What is the score?" Many people depend every day on our operators to awaken them at a certain time. A fire alarm in any part of the Keystone territory is inevitably followed by a volley of inquiries as to the location of the blaze. In the case of a large fire, these inquiries run into thousands and, as they have all to be answered within a very brief period, prove the severest test of the service.

MUST HAVE DISTRIBUTION.

Somebody wrote the other day saying that the telephone was a nuisance because he had to run down stairs to answer it. Of course, under those circumstances it was a nuisance. For 1½ cents a day that man could have had an extension telephone up stairs—right under his nose. To get the best out of your equipment you must have liberal distribution of it. For a large establishment to have one lone telephone station, necessitating a trip to it every time there is a call, is like having a rule requiring all employes to meet every visitor at the front entrance, instead of having all visitors go to the office where their business is to be transacted. Every incoming and outgoing telephone call should go right to or from the proper desk. That saves time and patience, and the daily cost of the necessary additional equipment is trivial.

HOME OWNERSHIP.

There is a railroad in a western state that was originally financed almost wholly by the people of its home commonwealth. Nearly every member of its board of directors and every official of the company was a resident of that state. The management was right on the job at all times and the road was operated with wonderful efficiency. It enjoyed, in a peculiar way, the confidence and the pride of the people along its lines and with that came, of course, material and notable prosperity. A few years ago control of that road went into other and alien hands. Its headquarters were moved to New York, and from there its important officials and directors operated it. The evil results came quickly. The personal and mutual interest based on the fact that owners and customers were neighbors in close touch with each other was gone. The fine responsiveness of the management to the patrons vanished. Efficiency was a thing of the past. The road's progress down hill was notable.

That is the whole story of home ownership in a nutshell. The home ownership and management of the Keystone Telephone Company is one of the strongest influences in its success. That is not the result of sentiment. Business is a hard, cold fact and not a sentiment. The Keystone telephone business is a hard, cold fact. But it enjoys all the inevitable benefits of being owned and directed by home people. The guidance of its affairs is wholly in the hands of those who daily walk the home streets and intimately know the wants of home people. They cannot escape from complaints of poor service. They cannot but feel a stimulating pride in the company's efficiency.

THE LONG DISTANCE BUSINESS.

The great preponderance of traffic for all telephone companies is local. This is an important operating fact not generally recognized by the public. Most companies do not have more than two per cent of their total business in what is known as long distance or toll messages. Nevertheless, the Keystone Company has provided for its long distance business and such traffic is handled with the same care as the local messages. In addition to our long distance lines, we have traffic arrangements with all the surrounding independent companies. Eighty-six companies reaching twenty-three hundred communities are included in this system. Two large submarine cables containing four hundred wires cross the Delaware River between Pennsylvania and New Jersey and are used exclusively for the Keystone Company's interchange of traffic between the two states.

THE TRUTH IN BRIEF.

Among the points to be especially emphasized about the Keystone service then are:

The unlimited service is quicker and cheaper. For those who prefer it, we furnish a measured service.

Those who have Keystone telephones should use them whenever possible. It is like throwing money out of the window to use measured service, when an unlimited telephone is available.

Competition in telephone systems, as in every walk in life, is stimulating as to efficiency and depressing as to cost.

Sixty per cent of the local messages are carried over the Keystone lines, and no efficient manager will allow himself to be cut off from this main artery of commercial speech.

Home ownership of any enterprise means more watchful management, more satisfactory service, and the Keystone Company is home owned.

There is no more difficulty about dealing with two telephones than there is about two doors, two elevators or two railway lines.

No matter how much you use it, you can have the Keystone unlimited telephone for less than 25 cents a day. As insurance against business loss alone that is a trifle.

Again let me remind you that every man, woman and child connected with our company can help to spread the facts about our service and so assist in the selling of telephones. Once the service is sold, we should be energetic in having the equipment promptly and efficiently installed. Insist on its use whenever possible. Then make our service in courtesy and effectiveness so notable that once a Keystone subscriber shall inevitably mean always a subscriber.

Telephone Between Cartagena and Barranquilla

Vice Consul Leonard Blake Modica, Cartagena, Colombia, says that, according to a recent report, arrangements have just been completed to connect by telephone the ports of Cartagena and Barranquilla, Colombia, which are separated by a distance of 65 miles. The promoters of the company are Colombians, and the line will be erected with Colombian capital.

The line will pass through the villages of Santa Rosa, Santa Catalina and Clemencia, at each of which will be installed an intermediate station.

The Telephone Law of Minnesota

An Address Before the Minnesota Independent Telephone Association

BY COMMISSIONER CHARLES ELMQUIST

THE Telephone Law of Minnesota is the result of ten years' agitation for state regulation. Discussion generally revolved around the subject of physical connection and discrimination in rates and services, and, incidentally, the department which was to have the work in hand. There are those who advocated the creation of a separate commission to be appointed by the governor; others to have the control vested in the Tax Commission, which is appointed by the governor, while a third school advocated placing the law under the Railroad and Warehouse Commission, whose members are elected by the people at large, each for a term of six years. This was finally done. Whether the legislature was wise in its decision to place the control of all telephone companies under this commission is a question which can best be answered by the results which will finally be obtained.

However, much can be said in its favor. The Railroad and Warehouse Commission has been in existence in this state for over thirty years, and during this time it has had control of the rates, services and practices of the railroad and express companies operating within the state, of the terminal and local grain elevators and warehouses, and the inspection and weighing of all of the grain which enters the terminals in this state. No commission in the country has secured greater results for the public, and no state today has a fairer or more reasonable schedule of freight and express rates, nor a more perfect system of weighing and inspection, than we have here.

After a study of the law, which was approved on April 16 and became effective July 1, 1915, it was found necessary for the commission to prepare blank forms so as to get a detailed statement of their business as of June 30, 1915, the information required consisting principally of names of telephone companies, organization and number of stockholders, officecrs, capitalization, bonds, operating revenues and expenses and the nature of the plant and equipment, and, in addition to the above, they were required to file schedules of their rates for every kind of service. It was found on investigation that there were in the neighborhood of eighteen hundred telephone companies operating in the state, seven companies with gross earnings of over $75,000 per annum, forty-four with earnings over $10,000, and about fifty-three with operating revenues of $5,000 and over, the gross earnings of all the other telephone companies being under that amount. Because of the large amount of work entailed it was necessary to build up an organization to handle it efficiently, and since the law became effective the commission and several of its employes have been devoting practically their whole attention to the analysis of property reports, rates, service conditions and legal questions, which have from time to time been presented.

The regulation of public service corporations is controlled by certain general principles. The same general rules which apply to the question of reasonable public service, rates, practices, methods of accounting, classification of services and discriminatory practices of the railroads should also govern in the control of telephone companies, water power companies, and gas and electric companies. Therefore, it is all important that the regulation of all public utilities should be under the control of one body, because only in that way can there be a well settled, orderly and uniform policy.

Regulation when properly applied is neither a burden nor a menace. Regulation means that the individual or the corporation must yield its liberty of conduct for the public good; corporations cannot engage in free and unrestrained practices and policies; cut throat rates, favoritism to individuals, and shoddy and careless practices will be eliminated for a more stable, reasonable and business-like administration. Hereafter the state, through its commission, will regulate the practices, accounting, the rates and services of telephone companies. The members of the commission do not appear before you in the capacity of telephone experts, nor as men desiring to show their authority, but rather as officers who are engaged in the same business that you are, earnestly seeking light and information from experienced men and desiring to co-operate with the telephone companies in all things which lead to the improvement in service, standardization of practices, and in securing for the telephone company and the public rates that are just and reasonable. The regulation applies to the big as well as the small telephone companies and the representatives of all of them are cordially invited to come to the commission for information as to the meaning of the law and other questions which sometimes worry and perplex the telephone man. Much good will result from frequent conferences upon practical questions between the commission and representatives of the companies. The benefits of the law and those growing out from the conferences that may be held will not at first be apparent, but in the course of time we trust that the companies as well as the public will approve of the law and its administration.

The law has created a marvelous change in the telephone situation. Prior to the first day of July, the state had nothing to say about a rate or a practice of a telephone company. These concerns were free agents and could do what they pleased, regardless of the effect upon a patron or a competitor. Upon the first day of July this condition was changed and state control was inaugurated. Upon that date it became the duty of the companies to file their schedules of rates, tolls and charges for every kind of service, together with all rules, regulations and classifications, with the commission, and thereafter it became the duty of the telephone company to charge the published rate and to observe the published rules and regulations and to make no change in any rate or practice without the consent of the commission. The law is mandatory, and the commission has no power to release any company from a strict compliance therewith. The publication of rates and practices and the provision that they must be charged and not changed without the consent of the state is the very essence of regulation. The same rule applies to railroad companies, and it has

been of immeasurable benefit to them and to the public. Rate schedules should be intelligently prepared so that any person can tell just what the legal charge is for any any all kinds of service. Under no circumstances can a company charge anything but the published rate. The law forbids a company from charging more from one person than from another for a like and contemporaneous service under similar circumstances, and likewise forbids free service to anyone but officers, agents or employes of the company. Full scheduled rates shall be charged without discrimination for all other services.

The commission has ruled that telephone companies may make a reasonable classification of service where operating or other conditions justify them. It is doubtful, however, if a classification of service can be based upon the ownership of stock in a company, and if that be true the stockholders must pay the same rate for either a toll or rental service as a non-stockholder who receives the same kind of service. The stockholder must get his return through dividends and not through lower or preferential rates. It will take some little time for telephone managers and stockholders to thoroughly understand this provision of the law. In many cases subscribers have purchased and paid for telephone instruments and have received a lower rate on account of such ownership. A classification based upon such a condition would not be proper, and, therefore, it would be wise for the telephone companies either to purchase the instruments or to pay a reasonable rental therefor, but the rental so paid should have nothing to do with the reasonableness of the rate for the telephone service.

The commission has the power, upon its own motion, to investigate the reasonableness of the rates of any telephone company, and the same can also be done upon a complaint filed by any citizen of the state. The reasonableness of a rate is a question of fact which can only be determined after a thorough investigation. The power to prescribe a rate presupposes a thorough and scientific investigation. The commission cannot indulge in guesswork or go upon fishing excursions in determining such questions, but the conclusions must rest upon a showing of facts. A rate prescribed without evidence to support it would not be worth the paper upon which it was written.

The commission is advised that some of the telephone companies increased their toll and some of their local rates prior to the first day of July, and this has resulted in considerable complaint. The companies had the legal right to make those changes prior to the first day of July, and the commission had no power to prevent that action. When the rates were filed with the commission upon the first day of July or within a reasonable time thereafter, they became the legal rate and are such until changed by either the consent or order of the commission. In due time some of these increases will be investigated. If it should be determined that such investigation requires the physical valuation of all of the property of one or more of the large telephone companies in the state, it is doubtful if it can be completed before the legislature has appropriated sufficient money to carry on that work.

While on this subject I desire to call attention to a practice which is very annoying to the commission, and, to say the least, very unsportsmanlike. I have on my desk a circular letter sent by a telephone company to its subscribers dated July 1, 1915. In discussing the Minnette Telephone Bill it says in part:

This bill also provides that all companies must once each year declare a dividend, otherwise they will be declared insolvent by the State Warehouse Commission and put out of business. This bill further provides that said commission shall have power to establish all rates, both tolls and rentals for all telephone companies in the state. In view of this fact a meeting was called at blank about June 1 by representatives of all of the telephone companies doing business in this part of the state. A representative was also there from the State Warehouse Commission. The telephone companies were told that no rate less than one dollar per month would be accepted anyway after July 1, 1915, and that might be raised at any time the commission saw fit to do so. To comply with the above law your board of directors at the semi-annual board meeting held June 29 established a rate of one dollar per month on all party lines, to take effect July 1, 1915.

This is simply an attempt to place the responsibility for an increase in rates upon the Railroad and Warehouse Commission instead of upon the shoulders of the telephone company, where it properly belonged. The commission did not have notice of the meeting that was held June 29; no representative of the commission was present at that meeting, and no order or ruling has been made by the commission which provides that no rate less than one dollar per month would be acceptable after July 1, 1915. Where a telephone company economically and judiciously manages its affairs and finds that its revenue does not bring in a fair return upon the value of its property or its investment therein and that competition or other factors are not seriously interfering with its earnings, it should be entitled to a reasonable rate. Any increase made upon or prior to the first day of July was upon its own responsibility. Fair co-operation between the state and telephone companies cannot exist where representatives of these corporations deal in misrepresentations.

The law provides that the commission shall prescribe a system of accounting to be used by telephone companies and it shall make and furnish blanks and forms for the reports, all of which shall conform as nearly as practicable to the rules, classifications, accounting systems and reports prescribed by the Interstate Commerce Commission for the interstate business of like size companies. Many of the companies in the state, especially the smaller ones, keep books so imperfectly that it would be extremely difficult for the state to find out from the records just what the financial status of the company really is. The accounting system must be uniform for telephone companies of the same class. You may expect to receive in due time rules and regulations prescribing the method of keeping your accounts, and we shall expect you to live up to the system when adopted. It will not be difficult, technical or unscientific. The aim of the commission will be to establish a system which will be acceptable to the companies, provide the necessary information for the stockholders and the state, and which with a little practice can be taken care of by the companies without any difficulty whatever.

While a great deal has been said in the state about the necessity for physical connection, yet very few questions of that kind have been presented to the commission. It may be that many of the companies have considered the statute mandatory in its terms and have installed connections whenever request has been made. The law does not provide for physical connection between two exchanges, so it in nowise interferes with the telephone companies where a duplication of exchanges now exists in a municipality. Section 10 provides that "in case of failure of the telephone companies concerned to allow or agree upon such physical connection or connections or the terms and conditions upon which the same shall be made, application may be made to the commission for an order requiring such connection and fixing the compensation, terms and conditions thereof." The construction placed upon this part of the law by the commission

is that a demand for a physical connection must first be made upon the companies, thereby giving to them an opportunity to make or refuse a connection or to agree or refuse upon the terms upon which the same should be made. If the companies fail to connect or agree upon terms, then a petition may be filed with the commission. This construction is entirely reasonable, because most of the questions of this kind can easily be settled by the companies without the interference of the state. In proceedings brought before the commission under this section the petitioner must be able to prove that demand and refusal has been made, and upon failure to make such proof the petition would have to be dismissed.

Section 13 of the act, which authorizes the commission to grant authority to construct telephone lines, has raised several interesting questions. Several inquiries have been made as to whether the commission was required to grant authority to a rural line to build an entirely new system or to construct an extension of its lines. This section does not limit the powers of a rural telephone company which operates wholly outside of the corporate limits of a municipality. It may organize and construct a system of rural lines or it may extend its system through and into adjoining townships without securing the consent of this commission. The issuance of indeterminate permits by the state is confined to the operation of exchanges within a municipality, and the term "municipality" is not broad enough to include the limits of a township.

My thought has been to present a few general observations upon the scope of the law, to assure you that we are earnestly endeavoring to comply with the law and that we desire your honest and hearty co-operation in this very important work. If errors are made by the commission in its rulings, orders or decisions in the administration of the law, they will be errors of judgment and not of the heart. We need your help and you need ours, and it is well for us to do some real team work.

Leakage of Current from Electric Railways

A study of the problems connected with the leakage of current from electric railways has recently been completed by the Bureau of Standards, Department of Commerce, and the results just published in Technologic Paper No. 63.

The theory of the leakage of current from electric railway tracks is developed mathematically, and curves are then plotted to aid in the interpretation of the results. The conclusions to be drawn from the formulas and curves are discussed with special reference to practical problems in electrolysis. It is shown how the escape of electricity from the rails is affected by increasing the track conductivity, as by careful bonding of all joints; by the use of a high resistance roadbed; and by shortening the distance over which a power house or substation furnishes power.

The paper is intended primarily for electric railway engineers and others familiar with electrolysis problems. Copies may be obtained free of charge by persons interested upon application to the Bureau of Standards, Washington, D. C.

Kellogg Company Pays 50 Per Cent

The Kellogg Switchboard & Supply Company on March 21 cut a melon for the stockholders. A stock dividend of 50 per cent was declared payable to stock of record. The dividend record of the company is unusual. In 1906 a 50 per cent cash dividend was paid. In 1909, 52 per cent was distributed in cash. In 1910, 100 per cent in stock was paid. Twenty-five per cent in stock was paid in 1913 and again in 1914. The present capital is $1,675,500.

Telephone-Post-Office Monopoly in Uruguay

Government control of the telegraph, telephone, and post-office service in Uruguay has been under discussion for several years, and is now authorized by a law published in a recent number of the *Diario Oficial*, Provision is made for the entire reorganization of these public utilities as soon as the government can perfect arrangements for taking them over from the companies and individuals now operating them. Departmental offices will be established in all the capitals of the departments of Uruguay, and the country will be divided in zones and districts for the better administration of the services.

The general offices of the monoply will be in Montevideo, and the administrative work will be in charge of a board of directors of seven members. The director and the assistant director of the telegraph, telephone, and post-office service will be ex officio members of this board; three members will be appointed by the president with the approval of the senate or of a permanent commission during a congressional recess, and two will be elected by the personnel of the monopoly. A special executive decree has been issued, providing regulations for the election of these two members. The president may not appoint as members of this board persons who are not citizens of Uruguay, who are under 25 years of age, who are members of Congress, or who are in a state of bankruptcy.

The duties of the board of directors will be the general management of the three branches of public utilities, establishing the technical and administrative procedure in each; preparing an annual utilities budget to be submitted to congress; fixing domestic rates, and lowering them when possible, though not more than 50 per cent without legislative authority; fixing international rates in accordance with treaties or conventions; determining the units of weight, and establishing the limits of weight, measures, quantities, amounts, and the forms of payment; classifying shipments; authorizing expenses; arranging the issue of postage stamps; suggesting to the President the appointment of delegates to congresses and conferences; providing increases or improvements in the present service, and furnishing new service; and investing the profits of the monopoly according to the provisions of the law. A plan for a postal-savings system is also to be submitted to Congress by the board of directors.

The division of the profits shall be as follows: Fifty per cent for increases, improvements, installation of new lines, construction of buildings, and for amortization and interest on contracted loans; 30 per cent for the gradual lowering of postage rates and other rates—the postage on a letter to the interior of the country shall not be less than 2 centesimos (2.0684 cents), and the minimum rates on telegrams shall not be less than 10 centesimos (10.342 cents) for 10 words; 20 per cent for the benefit of the personnel of the monopoly, at such time and in such form as may be determined by the board; provision is made, however, for special payments, and for the establishment of a medical and pharmaceutical service for employees and their families.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

IN THE course of the last few years there have been frequent successful attempts to increase the distance over which telephone conversation can be carried on. Here in America we have seen the successful completion of the New York to San Francisco line; in Europe the line Berlin to Milan was completed a few years ago, a distance of 1,200 miles. All of these extensions must be traced to the use of Pupin coils. In none of these lines are special instruments used which tend to strengthen telephone conversation by taking the weak telephone currents at the end of a section of line, strengthening the current and then sending it at that greater strength into the second section of the long line. The present article will reproduce several of the devices used for strengthening telephone currents on fairly long distance lines.

The problem of constructing such instruments may be divided into two parts, which are entirely independent of each other. First of all, an apparatus must be built which will strengthen the telephone currents without distorting the sound waves. The second part of the problem is to build an apparatus which will strengthen telephone currents no matter from what direction they come. The simplest method, which is most frequently used, is that in which the movements of a diaphragm of a receiver are made to react on a microphone. The microphone is connected with the membrane or diaphragm of the receiver in such a way that the diaphragm movements caused by the telephone current cause direct changes in the microphone resistance and consequently changes in current in the microphone current circuit. An induction coil connected into the microphone circuit then passes on the strengthened telephone currents to the second relay of the telephone line. Fig. 1 gives such a fundamental wiring diagram of a telephone repeater. On the left side the weak telephone currents are received and are then sent over the repeater to be sent on with increased strength to the right hand side of the repeating coil into the line.

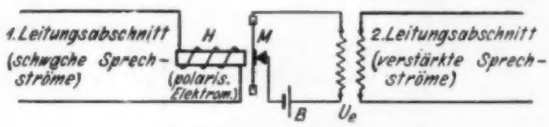


Fig. 1. Fundamental Diagram for Strengthening Telephone Circuit.

As simple as this scheme seems theoretically, it is difficult technically to build the right kind of apparatus, so that the current shall be strengthened and yet the speech transmitted without distortion. For such an apparatus very sensitive receivers and microphones will have to be used. In addition care must be taken that the diaphragm of the receiver is not affected so as to give vibrations of its own through the action of the telephone currents. These would then be transmitted to the second relay of the line and would prevent a faithful repetition of the sounds received from the first section of line. Nor must there be opportunity either for the carbon particles of the microphone to cling to each other and form a solid lump. This would decrease the power of the repeaters and would prevent an efficient strengthening of the currents. One of the best known repeaters is that invented by the American Shreeve and used all over the world. The apparatus consists of a special type of receiver built by Gundlach. The permanent magnetic field required for the receiver is produced electromagnetically by the battery *HB* (Fig. 2). The receiver therefore has two coils; one local circuit coil

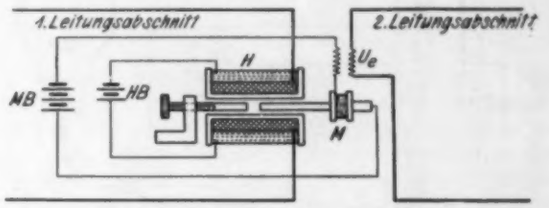


Fig. 2. Shreeve Repeater Wiring.

for maintaining the magnetic field and one coil to be connected into the first section of line to be strengthened, in order to receive the telephone currents. The microphone is fastened to a rod of soft iron, which, as the core of the receiver-electromagnet, is displaced from its position in the direction of the coil axis by the variations of the magnetic field, which are caused by the telephone current. A second mechanically changeable iron rod is used for the adjustment of the sensitiveness of the device. In this apparatus, which has been used in our country with some success, there is no real receiver-diaphragm.

Another repeater is that known as the Randall repeater. He has made special efforts to prevent the clogging of the carbon granules of the microphone even when fairly strong microphone currents are sent through the telephone. He uses a certain pressure on the carbon granules and distributes them over several separate containers. The vibrating portion of the repeater is arranged so that it can move freely at the edge and therefore can swing as a unit. Through this arrangement Randall has hoped to obtain a clear repetition of speech sounds.

A very remarkable repeater is that worked out by G. S. Brown, shown in Figs. 3 to 6. The telephone currents to be strengthened flow through the coils on the pole piece extensions *H*, which are angular shaped and of soft iron and are connected to the permanent magnet *NS*.

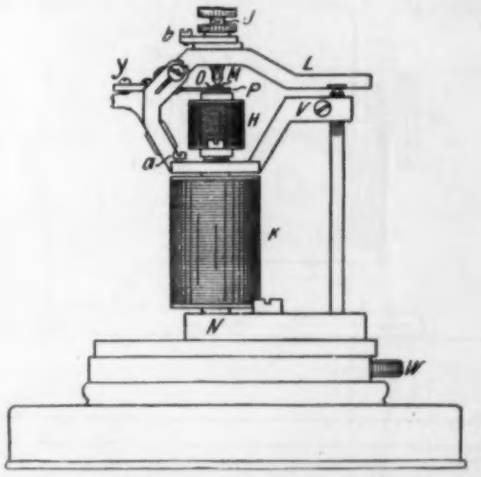


Fig. 3-6. Various Types of Brown Repeaters.

Opposite the pole piece extensions is a microphone contact, which consists of a piece of hard carbon *O*, fastened to the armature *P* of the dull iridium point *M*, and of a delicate adjustable set screw *J*. The screw is arranged so that new contact places can be formed, as often as necessary. The carbon contact can also be replaced by

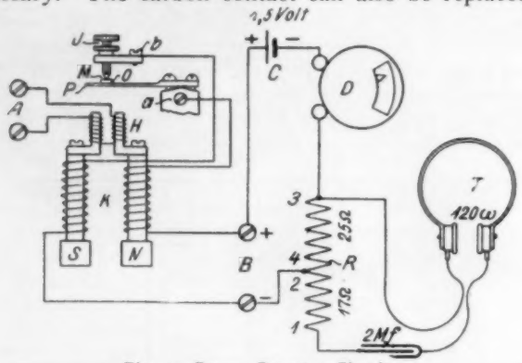


Fig. 4.—Brown Repeater Circuit.

an iridium contact. It is essential to place a drop of thin machine oil on the lower contact, before the upper contact is set on the lower one. The regulating screw *J* is fastened to an adjustable arm *L*. The contact surfaces are loosened enough so that the microphone effect can act. This is done by the aid of the delicate adjustable screw *W* and through the magnetic effect of the microphone direct current, which flows through the coils *K* on the pole pieces of the permanent magnet. The microphone contact *O* is practically in equilibrium, so lightly, however, that only very small forces are needed to change the contact resistance and with it the current strength within wide limits. The magnetic effect of the strengthened telephone currents, flowing through the coil *K*, is prevented by the eddy currents set up in the copper tubes which are passed over the pole piecs. *R* is an extra transformer for the connection of the second line section. This design is said not to have given the best results, as the increase of strength in telephone currents was too irregular and very dependent on outside influences.

Somewhat better results were obtained with the improved types, shown in Figs. 5 and 6. The fundamental

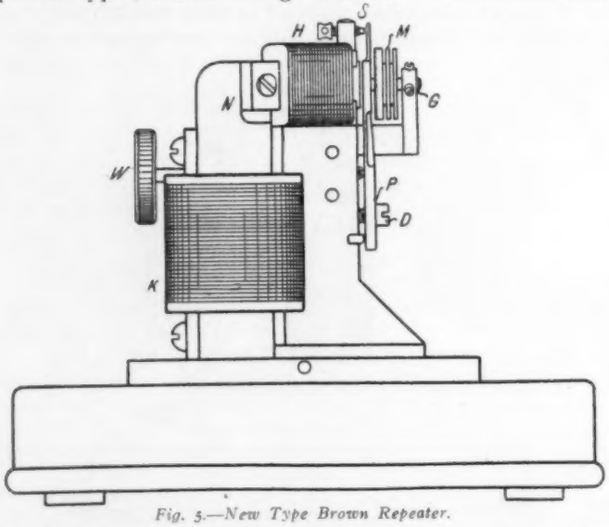


Fig. 5.—New Type Brown Repeater.

difference between the old and the new form is, that the microphone contact *M-O* has been displaced by a microphone compartment, which is filled with the finest carbon granules. The front section of the chamber is carried by an armature *P*, while the rear side is held by the insulated support *G*. The armature *P* can be adjusted in its relative position to the pole pieces by using the set screw *W*. As soon as the magnetic attraction balances the elasticity of the armature approximately, the repeater becomes very sensitive. The sticking of the armature is prevented by the screw *S*. The pole pieces are also arranged somewhat differently in this new form. As for the rest, there do not seem to be very vital differences between the old and the new type. The new Brown apparatus is supposed to strengthen the telephone currents about 20 times their original volume, without disturbing the tone quality. This would mean that the Brown repeater decreases the damping exponent *beta* 1 (β 1 by about 3.0. All of the receiver-microphone repeaters have the disadvantage that they are very sensitive against outside influences like shocks and have to be carefully protected against them.

Since a number of years the attempt has been made to obtain the strengthening of weak telephone currents by quite a different method. It has been found possible to use the processes going on in the gas discharge in a vacuum for the strengthening of telephone currents. Thus

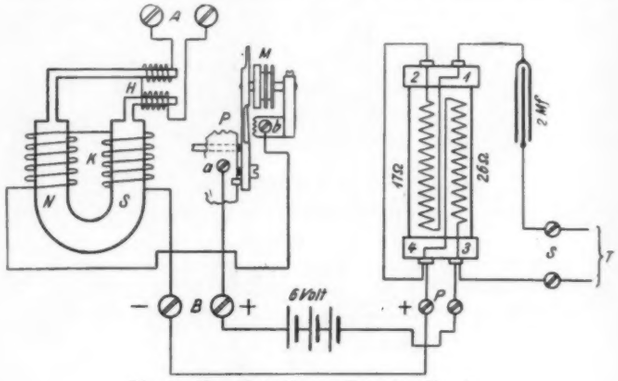


Fig. 6.—New Type Brown Repeater Circuits.

Taylor has tried to employ the Cooper-Hewitt mercury arc lamp for that purpose and have the magnetic effect of this lamp influence the currents. De Forest uses a gas discharge tube in which he produces cathode rays. Diagonally to these cathode rays he places a lattice-shaped electrode, which, however, fills only a small space in the tube. De Forest joined this electrode with the body which sends out the cathode rays, using in addition a condenser and a repeater.

Greater success was obtained by the Austrian, von Lieben, whose repeater is known as the Lieben repeater. This repeater is shown in Fig. 7.

This repeater consists of a vacuum glass tube, in which an auxiliary electrode, *HE*, is arranged between the two principal electrodes, the cathode *K*, and the anode *A*. This auxiliary electrode fills out the cross section of the vacuum tube completely. The auxiliary electrode is provided with a very large number of small perforations. The cathode consists of a zigzag-shaped narrow band of platinum, which is coated with a thin layer of barium or calcium oxide. This so-called oxide cathode is heated to red heat by a current of about 1.8 amperes from a storage battery of 30 volts. The heat obtained is about 1,000° C. Such a cathode is able to send, with even as small a voltage as 400 to 600 volts, cathode rays through the vacuum to the anode. The voltage necessary for this has been reduced still lower, to 220 volts, by producing in the vacuum tube a mercury atmosphere of about 0.001 mm. pressure. The mercury ions will then

take care of the current conduction in the gas-filled tube.

The auxiliary electrode *HE* is now charged by a branch wire from the cathode battery to any desired potential in proportion to the red-hot cathode. A large portion of the electrons going out from the oxide cathode is caught up by the auxiliary electrode and passed back to the battery. The auxiliary potential has a retarding effect on the speed of the electrons, which pass through the narrow openings of the auxiliary electrodes. The ions have not there the necssary power, after they have passed the auxiliary electrode and are on their way to the anode, to ionize the mercury vapor through the impulse of the ions, i. e., to split the neutral gas atoms of the mercury vapor into ions. Behind the auxiliary electrode we have therefore a lack of production of ions. Only after the electrons have passed over a certain amount of space under the effect of the discharge potential, have they enough vital force to ionize again through the ionization impulse. This shows in the apparatus, in that the spark discharge sets in, which extends uniformly to the anode. The line of separation between cathode dark space and spark discharge is fairly well marked. While the cathode dark space offers considerable resistance to the electric current, the ionized mercury arc space offers only very little resistance. The

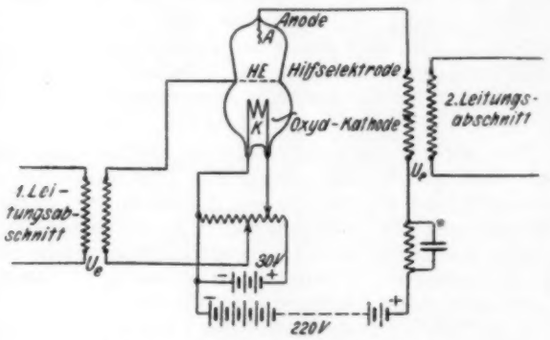


Fig. 7. Lieben Telephone Repeater.

electric current passes through the vacuum tube in form of cathode rays. From observations of the working of the repeater, it has been shown that with a definite adjustment of the potential, small changes of this potential correspond to great changes of the anode current. This gives the strengthening effect to the telephone currents. The currents to be strengthened need only be passed over the auxiliary electrode and will leave the anode circuit in augmented form. The current circuit, auxiliary electrode—cathode—battery (30 volt)—repeater and back of the auxiliary electrode is in a way a substitute for the primary portion, the receiver, the receiver-microphone repeater. The current circuit, auxiliary electrode-anode-battery (220 volt)-cathode and back to the auxiliary electrode represents the microphone current circuit. We deal here, however, with a microphone of high resistance, which with fairly high voltage varies within wide limits. The Lieben repeater strengthens leak a. c. in the ratio of 1:30, which reduces the damping exponent of the line by *beta* 1 (β 1)=3.4. Speech is reproduced clear and distinct. For operating the repeater, there are needed a battery of 30 volts, which must furnish about 2.3 amperes permanently, and a battery or a dynamo of 220 volts. If a dynamo is used, it is necessary to take care of the variations of the current caused by the slots of the dynamo commutator. For cathode ray current (30 volts) only a battery may be used, because here it is not possible to choke the variations from the dynamo slots sufficiently. It may be mentioned that this repeater can strengthen both a. c. and d. c.

All these repeaters strengthen the current in one direction only. The repeater prevents strengthening in the opposite direction. Practical operation in telephone

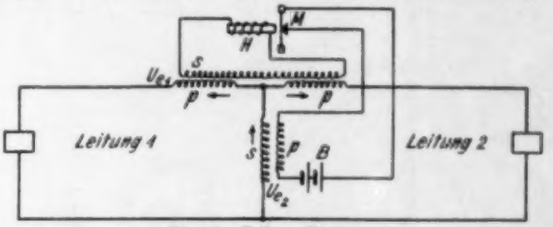


Fig. 8. Edison Repeater.

work requires strengthening in both directions. The repeater must act in such a manner that the increased currents will not react back on the repeater, from which they come. If this is not done, the repeater is forced to cause the vibrations and oscillations which we notice when we hold the receiver of a telephone against the microphone when the line is closed. The simplest double-acting repeater is that worked out by Edison, which is too well known to American telephone engineers to require further discussion, and is merely shown in Fig. 8 for study of comparison with other repeaters.

Another type of repeaters lets the currents be passed on to one side only but prevents reactions on the telephone instruments by the use of a compensating circuit. Such a system is that of N. G. Warth, shown in Fig. 9. Warth gives each line one repeater set. The currents coming from line *1* are conducted to the *b*-coils by the *a*-coils of the repeating coils *Ue1* and then passed on to the repeater *1*. The current strengthened by this apparatus is conducted to the line *2* by the *c*-coils of the repeating coils *Ue2*. At the same time a portion of the energy reaches the repeater *2* by way of the *b*-coils from *Ue2*. The effect of this portion of the current on the repeater *2* is prevented by the use of an auxiliary repeater, *Ue4*. This is connected both to the microphone current circuit of the first repeater and with the second coil to the repeater *2*. Warth tries to balance the effect of the current on the repeater *2* in this way, but this balancing effect in practice is not perfect, and the Warth repeater therefore does not meet all demands on a good telephone current strengthener. The difficulty of alternating re-

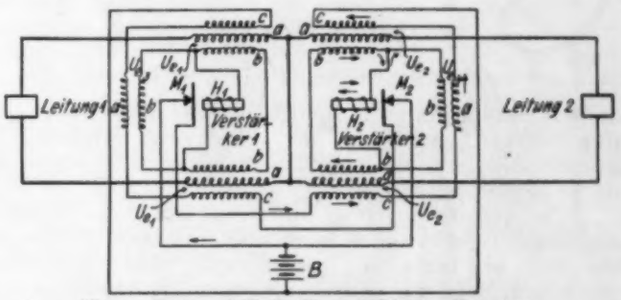


Fig. 9. System of N. G. Warth With Two Repeaters.

peating effect has caused several inventors to have the repeaters work in one direction only and then use a manually worked switch relay to change the direction. In order to obtain the automatic change, the telephone currents, after strengthening them by the repeaters, are made to react on the switch relays. The experiences with these types of repeaters are not broad enough to allow conclusions being drawn.—*Telegr. u. Fernsprech Technik.*

TESTING ARRANGEMENT FOR CORDS AND PLUGS.

The proper condition of the cords and plugs in the manual exchanges is one of the first prerequisites for efficient service. With the constant handling which these experience, there is the constant danger of trouble in service, as quite often defects in these cords or plugs are not noticed at once. Most of the faults occur of course in the cords less resistant, than the stronger plugs. The faults are usually such that they appear at once, if the equipment is inspected at regular and frequent intervals. But there are faults that are not located at once and give serious trouble before being finally adjusted. Even the plugs show defects. Thus in one special type of plug it has been noticed that metallic dust settled on one of the fibrous plates, which in the course of time formed a current conductor for telephone currents between the metal parts of the plug. A defect which is frequently found in plugs which are provided with a metal ring at the base lies in the injury to the insulation between metal ring and plug. This fault does not show

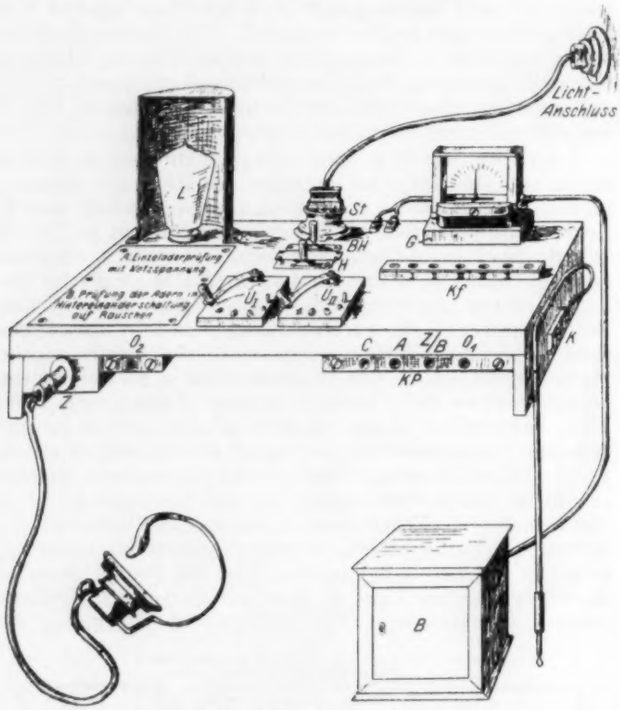


Fig. 10. Testing Equipment for Telephone Exchange.

at first until through a sudden impulse there is a contact between plug body and metal ring, producing a ground circuit in the plug and causing relay operation under certain conditions.

The repairs on cords and plugs are done in some exchanges right at the switchboards. In large exchanges the cords are taken to a special repair shop away from the boards. In the large exchanges the repair at the board is inadvisable, as the operators would be disturbed, causing delay in traffic. The cords used at the switchboards are usually tested at the operators' positions. The equipment in the cord repair shops for testing the cords is usually very simple, consisting in testing for insulation and conductivity by using the galvanoscope and several dry cells. Long experience has shown that this is not sufficient for locating all faults. Especially such hidden faults as the formation of metal dust on the plugs and minute insulating faults between metal ring and plug have escaped notice with such simple testing instruments. In addition these tests do not show whether there are any breaks in the conductors, which are not serious enough to break the contact but at the same time impede clear conversation by causing buzzing noises in the telephones. To find small insulation faults it was necessary at Hamburg to use a high voltage, the 110 volts of the lighting system. The second fault, that of buzzing noises, can also be located, even when the break in the conductor is very slight, using a delicate receiver for this purpose.

In order to make the necessary tests at the Hamburg exchange, the arrangement shown in Fig. 10 is used. The arrangement of the individual parts is as follows: On a base board is set, in the center, two knife switches, *BH* and *H*, back of which a plug contact, *St*, permits the connection with the lighting system. In front of the knife switches are two crank swithes, *UI* and *UII*, which have five contact pieces. An electric lamp, *L*, for 110 volts, provided with a black reflector and an ordinary galvanoscope, *G*, take places on both sides of the plug contact. Five pin plugs of strong German silver are placed like jacks in an ebonite strip, *Kf*. On the other side is a set of instructions. Below the base board at the front are the connecting jack *Z* for the receiver and the connecting jacks *KP* for the various types of plugs. On one side is a plug, *K*, with loose cord attached. A battery box *B*, with two dry cells, a telephone receiver and a light cord with double contacts finish the equipment. The wiring diagram for this arrangement is shown in Fig. 11.

For testing, the cord and plug are inserted in the proper jack of the jack strip *KP*. The end of the cord is connected to the testing equipment by inserting the cable ends into the plug contacts *Kf*. In doing this, the *a*-wire is inserted in the *I*, the *b*-wire in the *II*, the *c*-wire in the *III* contact. If four conductor cords are used, the *IV* contact is also employed. In the rest position, knife switch *BH* and *H* (middle position) the telephone circuit is connected to the test apparatus and the conductors are connected individually. By throwing over the switch *BH*, the two dry cells, the galvanoscope and the receiver are connected. At the same time switch *H* is thrown over, which connects all of the cord conductors in series. First of all, the individual conductors are tested by the current voltage for conductivity; the switch levers *BH* and *H* are then in the rest position. The levers of the switches *BH* and *H* are set one after the other on contacts *1*, *2*, *3* and *4*. As the wiring diagram in Fig. 12 shows, the lamp *L* has to light up, if the conductors are in good condition. With complete break of a conductor the lamp will not light and shows the fault. Now the following positions are taken in order: *UI* on contact *1*, *UII* in rotation on contacts, *2*, *3* and with 4 conductors on contact *4*. Then *UI* is set on contact *2*, *UII* on contact *3* or also on *4*, and finally *UI* on *3* and *UII* on *4*, if there are four conductors. In no case must the lamp light up. If this does occur, there is a contact between the conductors, and the fault can be located by watching the lighting when different contacts are used. For example, contact between *b*- and *c*-wires in the cord or in the plug would show, if *UI* were on contact *2*, *UII* on contact *3* and the lamp were to light up. After these tests have been made, the switches *BH* and *H* are thrown back again in order to test the conductors, which are now in series, for changes in resistance. For three-wire cord, *UI* is connected to plug *1*, *UII* to *3*, and for four-wire cords, *UI* to contact *1* and *UII* to contact *5*. While the plug is held

in the left hand, the cord is twisted in a circle with the right hand. If the telephone receiver gives a cracking noise, one wire is faulty or the insulation is faulty. With very coarse faults the needle of the galvanoscope will also move. If there is a fault, the wires are to be tested individually, after laying the switch *H* in the middle position, using battery and receiver for this purpose. The crank switch of the switch *UI and UII* is moved at the same time, so that the crank handle rests on the same numbers, which correspond to the contact numbers. Plugs with a metal collar are also tested for good insulation between collar and plug. To this end the switches *BH* and *H* are placed in the middle position; switch *UI* is set on contact *1*, *UII* on contact *3*. If there is a fault in insulation, the voltage will make the lamp *L* light up. The non-lighting of the lamp shows that the insulation is satisfactory. To test two-wire cords, a second jack is provided in the testing equipment, as is seen in Fig. 11 in the jacks *01* and *02*. Aside from the testing apparatus

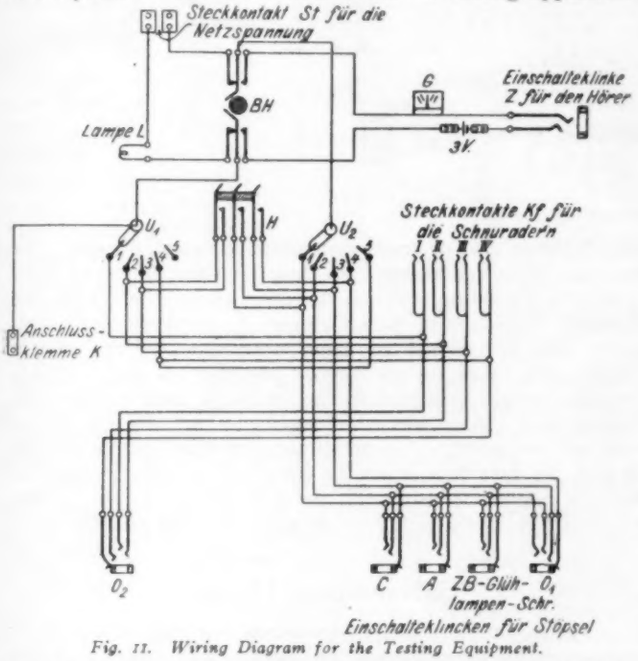


Fig. 11. Wiring Diagram for the Testing Equipment.

for the *A*-, *C*-, and *O*-plugs, there is also a jack for testing the plugs of the common battery lamps of subscribers. All that is needed is the connection of the proper jacks, which are connected in multiple with the jacks provided for in the apparatus.

The testing equipment has proved excellent and is so simple that telephone operators can be trained for this work in a short time. Cords and plugs that have been tested by this apparatus can be used on the switchboards without fear of hidden faults or trouble.—*Telegr. u. Fernsprech Tech.*

PRE-PAYMENT STATIONS IN SWITZERLAND.

Pre-payment telephone stations have developed enormously in Switzerland and they are found everywhere in public places, stations, stores, etc. The telephone department recently adopted a new system, which allows telephoning both for local and long distance calls. By long distance calls we mean the traffic between towns, which in a small state like Switzerland is as important as urban calls. The charges range from 5 to 50 centimes per call. The various details of these pre-payment stations are shown in Fig. 12.

First of all, it may be said that the person using the telephone does not deposit his money in the slot until the operator announces the amount of the charge. To avoid errors in payment, these slots are locked until opened by the operator. When the receiver is on the hook, the locking of the slots is accomplished automatically by the lowering of the hook. When the receiver is lifted, a current, furnished by battery *B*, passes into the microphone *M* and the induction coil *I;* the contact *c* is then closed and the relay of 400 ohms operated. This latter relay locks the slot again, which had been temporarily opened by the lifting of the receiver. The current just mentioned has also caused the operation of the calling relay. The telephone operator connects herself on the line by inserting her answering plug into the calling jack. She opens her rocking key and asks for the number. If she cannot furnish the desired number at once, she indicates the time when she will call the station again and disconnects. If she can give the number, she announces the amount to be paid and presses down a key marked "payment." This key is No. *1* in the figure. This operation immediately cuts off the current supply to the microphone, which liberates the armature *R* and also the money slots. Moreover, she presses down the adding key, which verifies the sum paid by the subscriber.

Suppose, for example, a 20-centime piece is inserted in the slot. As this piece of money strikes the lever 1_3, it depresses the latter, which grounds the +pole of the 12-volt battery and connects the —pole to the wire I_3. This contact lasts only as long as the piece rolls over the lever. A current then passes over the electromagnet *20* and the adding device electromagnet *50*. The armature *20* of the electromagnet *20* is attracted, being properly polarized. The attraction of this armature advances a ratchet wheel by one ratchet, the return movement of the latter being prevented by a pawl. This advance closes the local circuit of a lamp over whose top is inscribed the number *20*. The insertion of another 20-centime piece operates the electromagnet again, the lamp goes out and then relights again and over the lamp appears the number *40*. It is obvious that the operator can control the amount of money inserted by the telephone user without any trouble. After the money has been verified, the operator places the key at rest and calls the desired subscriber. During the entire conversation, the indicator sight *V* is in action and the flashing of this disc shows when the conversation is closed. After receiving the closing signal, the operator throws the key to the closing position, which operates the relay E_e, whose armature makes the money fall into the cash receivers. The conduction of current is controlled by V_e. This operation conects the wire *V* to the battery *B*, whose positive pole is grounded and operates at the same time the four electromagnets t_1 to t_4 of the adding device. The armatures of these electromagnets release the four pawls of the ratchet wheel, which are sent back by a spring to their original position. All the lamps are then extinguished and the adding device returns to the rest position. The connection is then broken.

If conversation has not taken place, the money is returned by pressing on a key marked "Return money," using key *2*, and the telephone user presses a button at his telephone instrument marked *B*. In this case a special sight disc lights up and announces to the operator the return of the money, and the adding device again returns to the rest position. Fig. 12 also shows in detail a pair of cords at the exchange, using a common battery system. The operation is exactly the same as the one just described, the only difference being that instead of illuminated discs to indicate the return of the money and

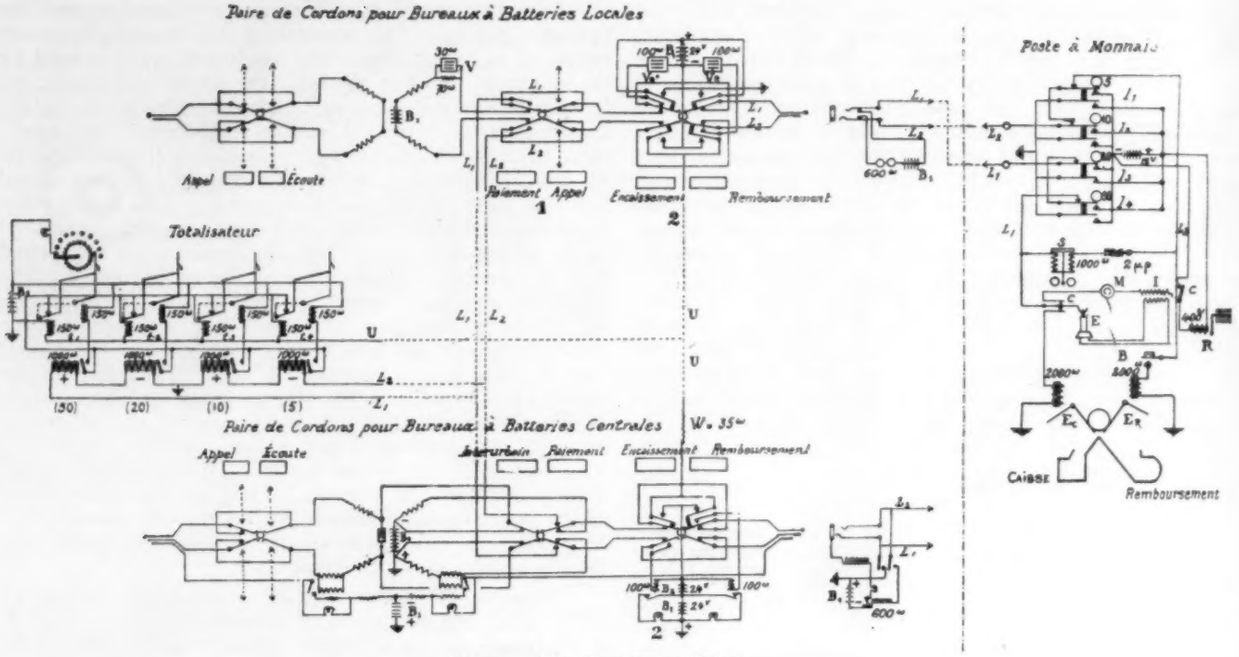


Fig. 12. Swiss Pre-payment Telephones.

end of conversation, pilot lamps are used. The only special point to be mentioned concerns key No. 1, which has a position marked "long distance," which it must take whenever no battery current is to be sent to the calling cord. At the exchange the adding devices are placed on a special switchboard. The pilot lamps to the number of 40 are placed in front of the operators, corresponding to the double cords; they occupy quite a little space and mark one of the disadvantages of this system. It has been estimated that one operator can take care of 50 pre-payment stations, although this has not been proved by practice.

An interesting rule in connection with these pre-payment stations, also used in Vienna, is one forbidding persons using one of the pre-payment booths longer than 10 minutes. There is no mechanical device which prevents him using the telephone longer, but the public has

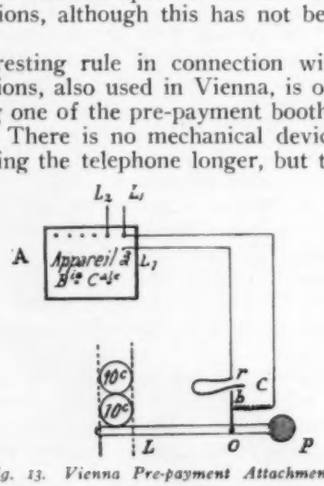


Fig. 13. Vienna Pre-payment Attachment.

accepted this rule in good faith and has adhered to it in most cases. In Vienna they also have introduced a very simple pre-payment device, which can be attached to any ordinary telephone and which is operated by a unique feature, shown in Fig. 13. *A* is the wall telephone of the regular type, whose wire from line *L* carries an interrupter, *C*, which acts as follows: The weight of the person entering the telephone booth presses down the flooring, which operates the equipment *OLP* in such a manner that the coil *b* is brought near the spring *r*, without closing contact *C*, however. When the coins have been inserted in the proper slots, their weight applied at the extreme end of lever *L* presses it down, closing contact *C*. The telephone can then be used like any subscriber's telephone. When the user leaves the booth, the flooring rises again, which causes *L* to press down and locks the entire pre-payment apparatus. The system *OLH* then takes on its former position of rest. *P* is a counter weight adjusted to the toll to be paid by the telephone user. Any pieces of money which do not fit the slot are rejected. An advantage in this simple design lies in the fact that it can be attached with little expense to any telephone and will not get out of order, owing to its simple construction.—*Annales des Telephones.*

Galvanometer Design

Galvanometers are instruments for the detection or measurement of small electric currents or small voltages and are much used in various kinds of electrical testing. The user of such an instrument is concerned with its sensitivity either to current or to voltages, its period, etc.; that is, he is concerned with its performance or operation constants. These necessarily depend upon the intrinsic or construction constants, which in turn depend upon the size, shape, kind of material, etc., of which the parts are made.

The relations between these two sets of constants are of interest to both the user and the maker of galvanometers. They are, however, of more importance to the maker, since they may be made to serve as a basis for predetermining values for the intrinsic constants such as will give previously selected or specified values for the operation constants. In other words, the relations in question will tell him what values the construction constants must have in order that the galvanometer may meet definite performance specifications.

These matters are discussed and illustrated by concrete examples in a paper just published by the Bureau of Standards, Department of Commerce. Copies of the paper, Scientific Paper No. 273, may be had on request addressed to the Director, Bureau of Standards, Washington, D. C.

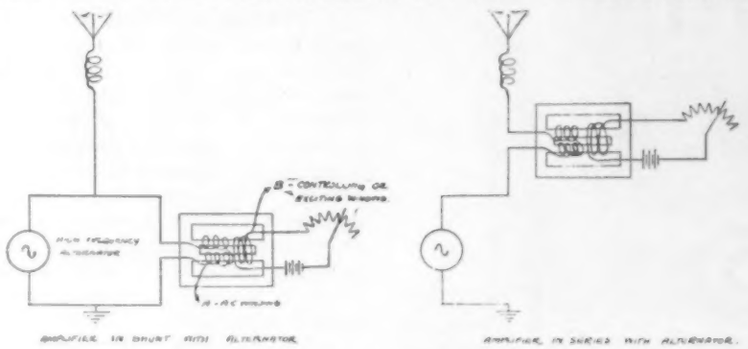
Magnetic Amplifier for Radiotelephony

Data from the Consulting Engineering Department of the General Electric Company

The magnetic amplifier described in this article, taken from the General Electric Review, is a new device which has been developed in order to make possible radiotelephony and high speed radiotelegraphy on a large scale. The magnetic amplifier has been developed as an accessory to a high power high frequency alternator. The magnetic amplifier is of the nature of a magnetic valve throttling the flow of power from the alternator so that the flow can be modulated by a telephone current. Oscillograms are given showing an output of 72 kws. radiofrequency energy, and also oscillograms showing the output of the alternator controlled by the human voice. This paper was read before the Institute of Radio-Engineers on February 2, 1916.

BY E. F. W. ALEXANDERSON & S. P. NIXDORFF

THE name of magnetic amplifier has been given to a device for controlling the flow of radiofrequency currents because this name seems more than any other to describe its function when it is used for radiotelephony. As the same device can be used for a variety of other purposes the above name may in some cases not seem so appropriate. However, the essential part of the theory that will be given refers to the amount of amplification which is possible of attainment and the methods of securing a higher rate of amplification than would be given by the device in its simplest form.



Figs. 1 and 1a.—Combination of Alternator and Amplifier in its Simplest Forms.

The fundamental principle of varying an inductance by changing the permeability of an iron core is suggested in the early work of Fessenden as a means for changing the tuning of a radio antenna. The magnetic amplifier constructed as shown in Figs. 1 and 1a was, on the other hand, developed as an accessory to an alternator in order to take advantage of the better mechanical construction of a solid steel rotor and yet produce the results that could be obtained by field control in a machine with completely laminated magnetic circuit. The aggregate of the constant field alternator and the stationary controlling device has, as will be shown, the effect of a machine with variable field excitation.

This analogy refers not only to the proportionality between excitation and electromotive force but to such phenomena as self-excitation and instability.

If two windings are related to each other and a common magnetic structure as shown in Fig. 1, it is apparent that there is no direct transformation possible from one winding to the other. Each turn in the controlling or exciting winding *B* includes both the positive and negative branch of the flux produced by a-c. winding, *A*, and hence there is no voltage induced. The current in either winding, on the other hand, influences the permeability of the common magnetic material and, therefore, changes the inductance of the other winding. If a current flows in either winding sufficient to saturate the iron, it is thereby rendered practically non-magnetic and the inductance of the other winding is reduced to the value it would have if the coil included only air. If, on the other hand, a current flows in the other winding which gives a magnetomotive force equal and opposite to the first, the iron is rendered magnetic again. Inasmuch as the two branches of winding *A* are relatively opposite to winding *B*, one branch will oppose the ampere-turns of winding *B* on one half cycle and the other branch during the next half cycle.

In order to have any large flux variation in winding *A*, the opposing ampere-turns must be at least equal to the ampere-turns in winding *B*. The relation of currents is substantially the same as in a transformer between the primary and secondary current although in this case one is an alternating and the other a direct current, or a current of different frequency. It is thus obvious how current flow in winding *A* can be regulated proportionally to a controlling current in winding *B*. When the magnetic amplifier is used in shunt to the alternator (Fig. 1), it has the immediate object of controlling the voltage rather than the current. The combined characteristics can be derived from the characteristics of the alternator when operating on an antenna and at the same time controlled by a variable shunt across its terminals, as in Fig. 4.

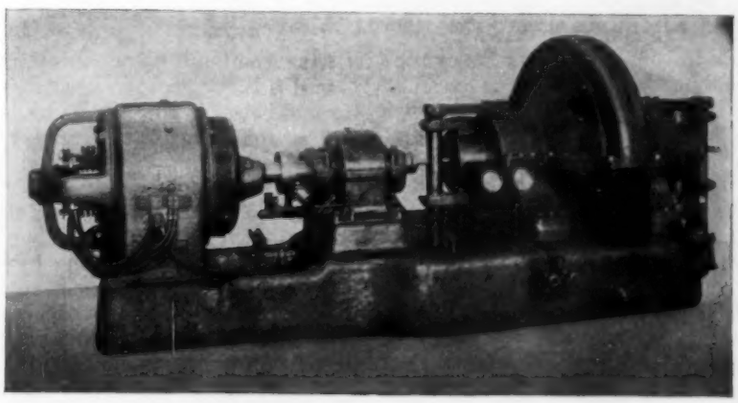


Fig. 2.—High Frequency Alternator Used for Tests.

As indicated in Figs. 1 and 1a, it is pos-

sible to connect the amplifier either in series or in shunt to the alternator. Of these two arrangements the shunt connection is preferable because the effect of the amplifier on the alternator is the same as if the electromotive force of the alternator in the antenna circuit had been reduced, whereas, the amplifier in the series connection does not influence the electromotive force in the antenna circuit but changes the tuning of the antenna. The result

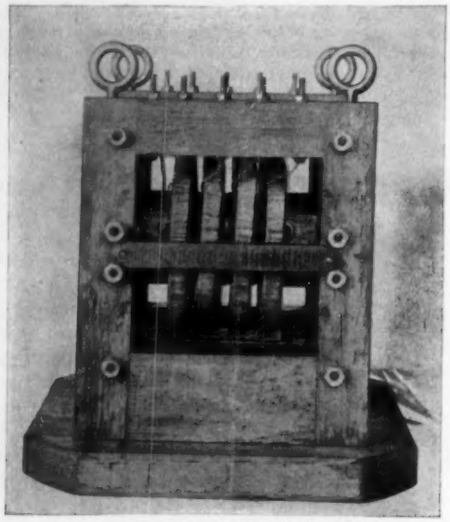


Fig. 3.—Amplifier Coil Used for Tests.

of this change in antenna tuning has an undesirable effect upon the speed characteristics of the alternator because it is found upon further analysis that the control does not become effective unless the alternator is operated on the upper or unstable side of the tuning curve of the antenna. If the alternator, on the other hand, is operated on the stable side of the tuning curve, the change in tuning partly neutralizes the intended controlling effect.

RATIO OF AMPLIFICATION

The method of arriving at a theory for the ratio of amplification can be perhaps best explained by a mechanical equivalent:

A throttle valve in a steam pipe may be designed so that it is perfectly balanced and it might move on ball bearings so that an infinitely small effort would be sufficient to throttle an infinitely large power flow. If, on the other hand, the valve were to be opened and closed 1,000 times in a second, the inertia of the moving parts would absorb considerable energy. Although this would be wattless energy inasmuch as the energy consumed in accelerating would be given back in retarding, the device which would perform this movement must control considerable power. In analogy with this we must ask ourselves, what is the corresponding inertia in our magnetic valve which we must overcome in opening and closing it at the rate of a telephone current. The answer is: The inertia is the energy stored by the change of the magnetic field. This energy is the integrated area of the saturation curve between the points where the changes take place. The energy of the controlling field is not necessarily equal to the energy of the high frequency field but of somewhat the same magnitude. The wattless flow of energy is proportional to the energy per cycle and the number of times per second the energy must be delivered and returned. It can, therefore, be said that the ratio of amplification is proportional to the ratio between the frequencies of the radio current and the controlling current.

However, the assumption that the energy per cycle is the same in the high-frequency and the controlling circuit is only a first approximation. The object of design and improved arrangements is evidently to make this energy ratio as favorable as possible; in other words, to produce a maximum flux variation in the high-frequency circuit for a minimum variation in the controlling circuit.

In order to understand these relations it is necessary to make a further study of the laws for change of permeability. The object of the magnetic amplifier when used for radiotelephony is not only to control the radio energy but to produce a telephone current in its true shape. An important part of the analysis is, therefore, a study of the conditions that lead to linear proportionality between the controlling and the controlled current.

MAGNETIC THEORY AND CHARACTERISTICS

The magnetic amplifier can be operated in two ways, as indicated by the diagram of Fig. 5. In one case when the two a-c. windings are in series, the current in both windings is definite and the flux in the corresponding branches of the core adjusts itself accordingly. In the second case when the two a-c. windings are connected in multiple the current in each winding is not immediately obtainable because a cross current of a strength not yet defined may flow between the two windings. We know on the other hand that the flux variations in the two branches of the core must be identical inasmuch as they produce the same terminal voltage in the multiple connected windings.

The characteristics of the amplifier winding in series and multiple connection as obtained from tests is shown in Fig 6. The upper curve represents series and the lower multiple. The curves are plotted in ampere-turns and volts per turn so as to make the conclusions independent of the number of turns. Both curves represent the same d-c. excitation. These curves, as well as theoretical consideration, show that the multiple connection gives a lower curvature and a lower impedance. For zero d-c. excitation it is evident that the volt-ampere curves for these two connections must be identical. It thus follows that the change of impedance corresponding to a given d-c. excitation is greater with the multiple connection. The multiple connection is, therefore, altogether more advantageous because a lower impedance with a certain control excitation means greater sensitiveness, and a lower curvature means that large currents can be carried without causing instability as will be shown later. While thus the second mode of operation with multiple a-c. winding appears to have better characteristics, there are some other considerations which must be taken into account before it can be concluded that this connection could be used.

OBJECT OF SHORT-CIRCUIT CONDENSER

In the multiple connection the flux variations are forced as already explained by the short-circuit that is formed between the two multiple coils. The induced current in this short-circuit tends to oppose any changes in the average flux, and thus a telephone current in the controlling winding would simply cause a corresponding short-circuit current between the two a-c. coils without producing the desired flux variations. This difficulty can, however, be overcome by taking advantage of the fact that the a-c. winding needs to operate only at radio frequencies, which are very much higher than the frequency of the telephone current. It is, therefore, possible to find a value of a condenser such that it acts as a short circuit for the radio currents and an open circuit for the telephone current. Accordingly a condenser is

introduced in series with each of the a-c. coils as shown in Fig. 8.

COMBINATION OF ALTERNATOR AND AMPLIFIER

In order to demonstrate how the magnetic amplifier can be used for controlling the voltage of an alternator, reference may again be made to the alternator characteris-

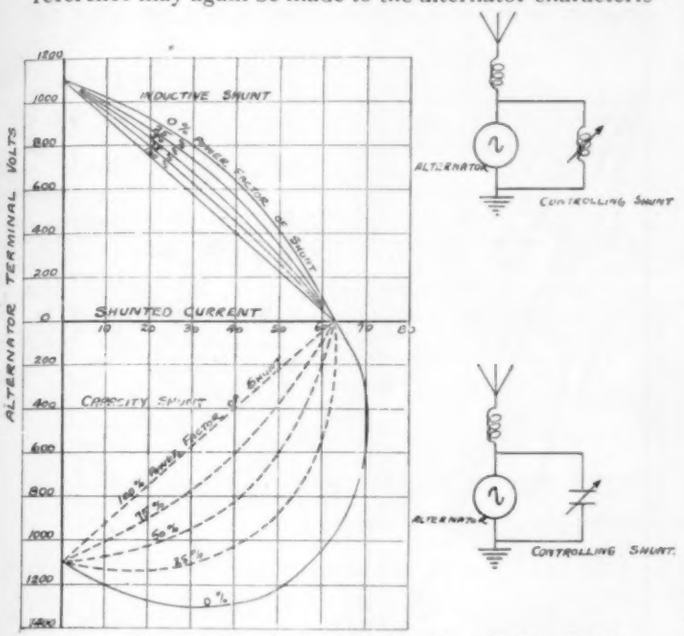


Fig. 4.—Characteristics of Alternator when Controlled by Variable Shunt Impedance.

tics, as shown in Fig 4. The alternator voltage is plotted against the current in the shunt circuit. The magnetic amplifier is used as this shunt circuit and the volt-ampere characteristics of the amplifier can, therefore, be directly combined with the volt-ampere characteristics of the alternator. The volt-ampere characteristics of the amplifier are shown in Fig 6. Fig. 7 shows the alternator and amplifier characteristics superimposed. The intersections between the sets of curves give the alternator volt-

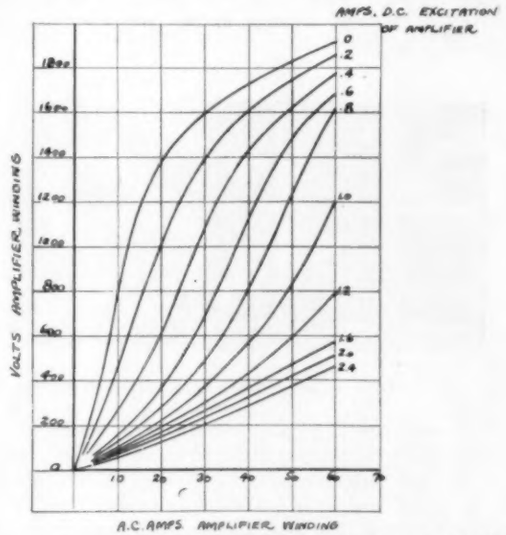


Fig. 6.—Characteristics of Amplifier Coil Windings in Multiple.

ages at the corresponding amplifier excitations and thus another curve can be plotted between alternator volts and amplifier excitation. This curve as obtained from test is the upper curve in Fig. 8, which approaches the X-axis asymptotically with increasing excitation of the amplifier. It is possible in this way to reduce the voltage practically to zero without using an excitation which is excessive from the point of view of heat capacity of the exciting winding. A magnetic amplifier may be used as a controlling device for radiotelegraphy. However, in this form, it is not well adapted for telephony because as shown by

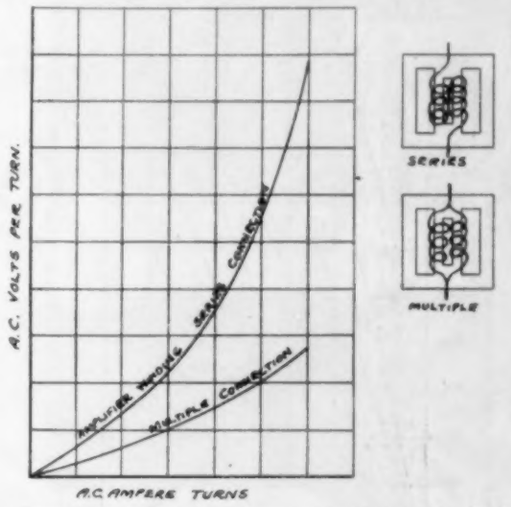


Fig. 5.—Comparative Volt-ampere Curves with the same D-c. Excitation.

the curves the relation of volt-amperes and amperes excitation departs too far from the desired linear proportionality. Such proportionality can be obtained by the introduction of a series condenser, as shown in Fig. 8, while at the same time the sensitiveness of the amplifier is greatly increased so that a much smaller control current is needed. If the condenser is chosen so that it exactly neutralizes the inductance of the amplifier winding at some definite value of excitation, the resulting impedance at this excitation becomes a minimum and the impedance at any lower excitation is determined by the difference between the inductive reactance of the amplifier coil and the capacity reactance of the series condenser. The smaller this difference, the lower will be the amplifier excitation that gives minimum impedance, and the corresponding minimum of the alternator voltage. This means that the sensitiveness of the amplifier is increased because a smaller excitation is needed to reduce the alternator voltage. The increase of sensitiveness that can be obtained in this way is, however, not unlimited. If the minimum impedance is obtained as a result of a large inductive and a large capacity reactance the core loss due to hysteresis and the eddy currents becomes appreciable and appears as an equivalent resistance which can not be neutralized. Fig. 8 shows from result of test the variations of alternator voltage that can be obtained by different values of series condenser and the corresponding increase of the sensitiveness of the amplifier. The sensitiveness is represented by the steepness of the curves. It can be seen from the shape of these curves that the increased sensitiveness is gained at the expense of range of control or difference between maximum and minimum voltage. However, all the curves show a practically linear proportionality between excitation and voltage over almost the whole range available. The difference in sensitiveness with various series condensers is also illustrated by oscillograms, Fig. 9. The upper curve represents alternator voltage. The two lower curves represent amperes and volts, respectively, impressed upon the amplifier controlling winding, the frequency of the con-

trolling current being 500 cycles. The effect of departure from linear proportionality and the consequent distortion of wave shape is shown in Fig 14.

The amplification ratio is defined as the difference between the maximum and minimum kilowatts output divided by the effective alternating volt-amperes supplied to the controlling winding. The ratio of amplification

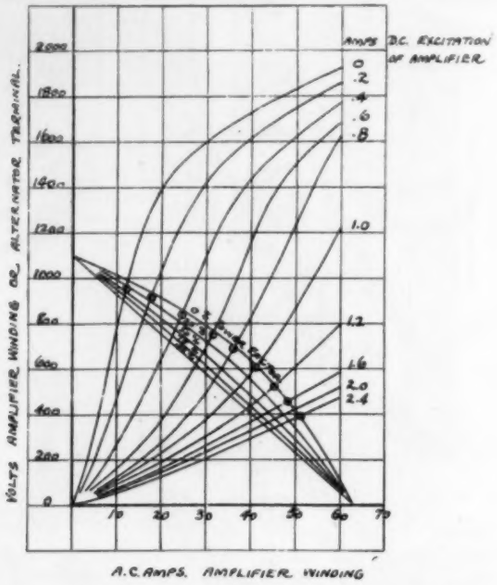


Fig. 7.—Alternator and Amplifier Characteristics Superimposed.

can be derived directly from the oscillograms with reference to the calibration of the oscillograph curves. The ratio of amplification for operation suitable for telephone control ranges from 100 : 1 to 350 : 1.

INSTABILITY

The voltage which results from the combination of alternator and amplifier can be determined as has been explained by the intersection of the alternator and amplifier characteristics. When the curves have a definite and sharp intersection point a definite alternator voltage results from each excitation of the amplifier. If, on the

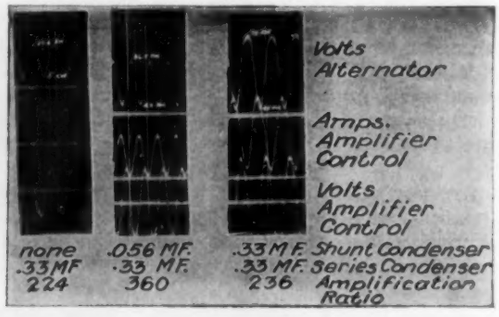


Fig. 9.—Oscillograms Showing Ratio of Amplification with Different Series Condensers.

other hand, the curves should have such a shape that the alternator and amplifier characteristic curves become parallel in some places, the intersection becomes indefinite and the result is instability and generation of self-excited oscillations. This is a condition that must be avoided for telephone control, whereas, it may have useful applications for other purposes. The conditions that lead to instability can be graphically analyzed as shown in Figs. 10 and 10a. The left-hand diagram corresponds to a series condenser of ⅛ mf., which leads to instability at higher generator outputs, whereas, the right-hand diagram corresponds to a series condenser of 1/3 mf. and represents a condition which is stable at voltages at which a generator can be operated. The upper curve in each diagram is the volt-ampere curve of the amplifier coil

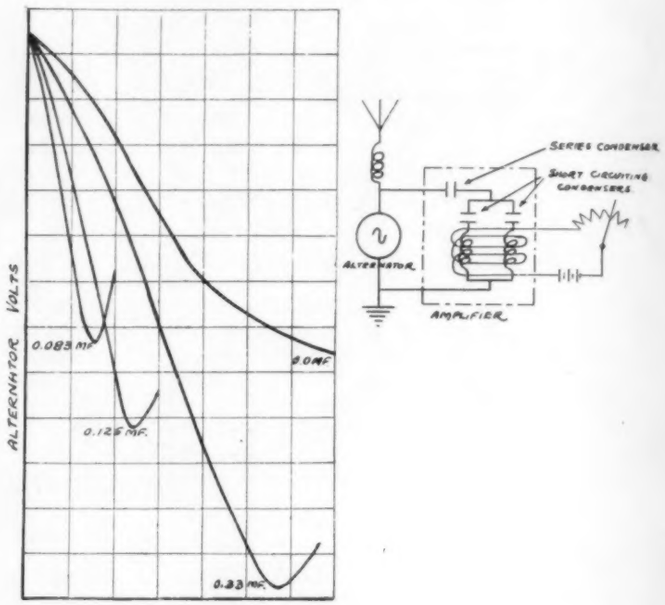


Fig. 8.—Curves Obtained from Test Showing Sensitiveness of Alternator Voltage Control with Different Series Condensers.

and the straight line through origin represents the series condenser. The low curve is the difference between the volts amplifier coil and volts series condenser, which is for the present purpose sufficiently close approximation of the volt-ampere curve of the combination. This resultant volt-ampere curve in Fig. 10 rises to a maximum, then falls again and crosses the zero line. The crossing of the zero line means change from inductive to capacity impedance.

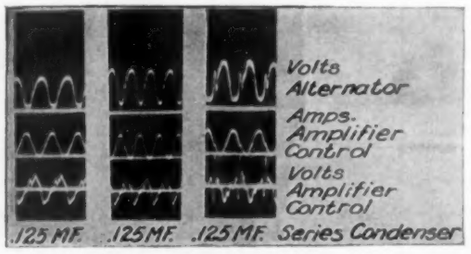
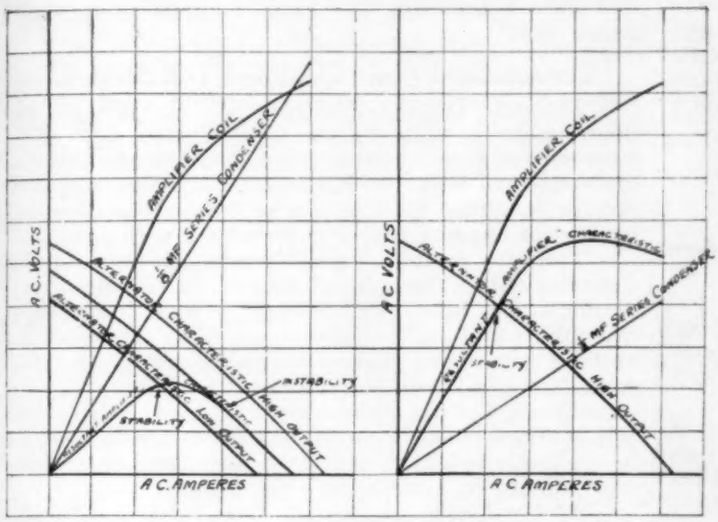


Fig. 11.—Oscillograms Showing Instability at Higher Alternator Volts.

With reference to any circuit which has a volt-ampere characteristic with a bend in it, it can be said that as long as the volt-ampere curve is rising, the circuit is stable where it is applied to a constant potential, and wherever the volt-ampere curve is drooping, the circuit is unstable on a constant potential. The rising part of the curve corresponds to a positive resistance and the drooping side to a negative resistance. Well-known types of negative resistance are electric arc or series commutator generator. A circuit of this character is stable only when

operated on a source of potential which has characteristics equally or more drooping than the drooping volt-ampere curve. These same curves (Figs. 10 and 10a) show the volt-ampere characteristics of the alternator. In Fig. 10a the resultant characteristic is only slightly drooping at the end, whereas, in Fig. 10 the condition for instability is



Figs. 10 and 10a. Graphic Analysis of Instability.

indicated by the place where the volt-ampere curve of the amplifier is more drooping than the volt-ampere curve of the alternator. Fig. 10 also shows that the alternator curve corresponding to low output intersects the amplifier by curves at the stable portion and the characteristics for increased output reaches the unstable portion of the resultant amplifier curve. This change from stability to instability is shown by the series of oscillograms on Fig. 11. The instability as shown by the self-excited oscillations reoccur at the same place of the wave which

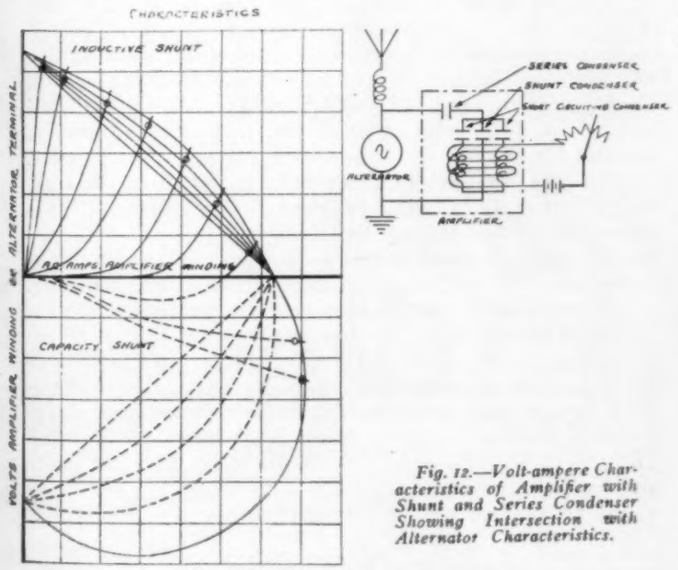


Fig. 12.—Volt-ampere Characteristics of Amplifier with Shunt and Series Condenser Showing Intersection with Alternator Characteristics.

is the place where the characteristic curves are tangent as shown on Fig. 10.

SHUNT CONDENSER

A further improvement in sensitiveness can be obtained by using a combination of shunt and series condenser. The shunt condenser is so proportioned as to make the amplifier take leading instead of lagging current at low excitation. Complete characteristic curves of amplifier with shunt and series condenser and the superimposed alternator characteristics are shown in Fig. 12. The series of oscillograms, Fig. 13, show the effect of different amounts of shunt condenser. While the

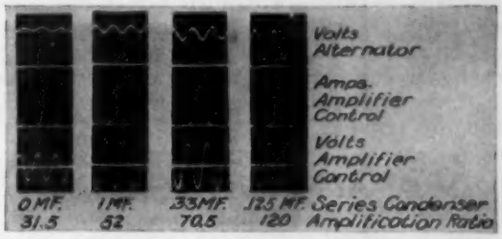


Fig. 13.—Oscillograms Showing Effect of Different Shunt Condensers.

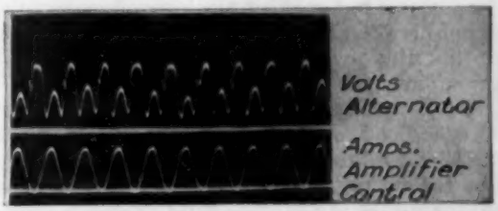


Fig. 14.—Oscillograms Showing the Effect of Departure from Linear Proportionality and Consequent Distortion of Wave Shape.

series condenser is used within the limits of stability to increase the sensitiveness, the shunt condenser has the object of allowing the alternator to assume its full maximum voltage. The last oscillogram, Fig. 15, shows an alternator output of 72 kw.

APPLICATIONS OF THE AMPLIFIER

Oscillogram, Fig. 15, shows telephone control of the alternator output. The two curves on the oscillogram which are relatively upside down show that the variation of the alternator voltage is in all details an almost exact reproduction of the controlling telephone current.

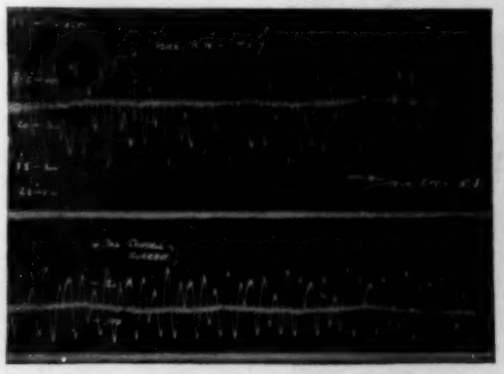


Fig. 15.—Oscillogram Showing Telephone Control.

While a specific method of adapting the magnetic amplifier to an alternator as described above has been worked out both theoretically and experimentally in greater detail, there are obviously a variety of possibilities for adapting the same devices and theories to other conditions. Outside of telephony, the magnetic amplifier will probably be found of value as a non-arcing key for telegraphy and particularly will make possible high-speed telegraphy at the same rate and with the same means as high-speed automatic telegraphy on land lines. Oscillo-

graph records have been taken of telegraphic control from 500 to 1,500 words per minute.

The structure and the mode of operation of the magnetic amplifier which has been described is such that there appears to be no limit to the power that might be controlled in this way if apparatus are designed with suitable dimensions. The 72-kw. control which has been demonstrated may be sufficient for most purposes but there would be nothing surprising if several times this amount of energy were to be used in transatlantic radiotelephony or high-speed telegraphy in order to make the service thoroughly reliable.

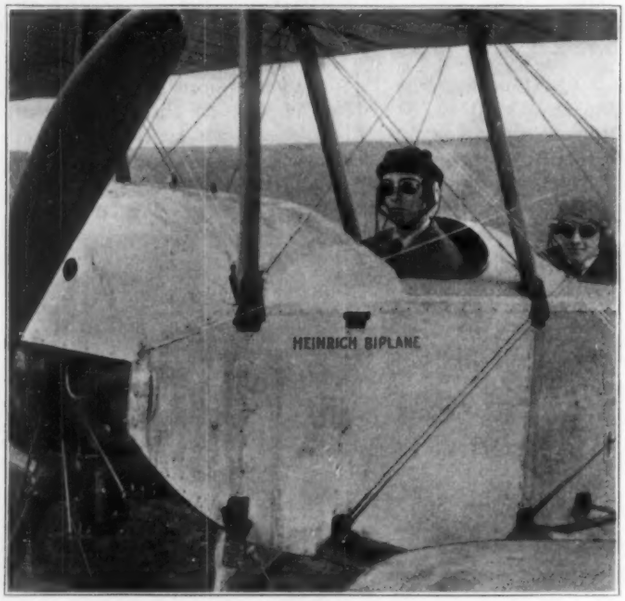
Aeroplane Telephones

By Frank C. Perkins.

The accompanying illustration shows the modern equipment utilized for telephoning in aeroplanes as recently developed at Chicago, Ill. The rush of the wind and the deafening roar of the propeller discourage conversation between the pilot and the passenger in an aeroplane, but this special telephone equipment makes such conversation possible.

The apparatus, called an "aero-phone," consists of two double-head telephone receivers and two special types of chest transmitters. The receivers are held against the ears by the spring head band so that practically all of the disturbing noises are excluded. The spring tension, however, is such so that the entire outfit is not uncomfortable.

There are special transmitters provided with soft rubber caps, and are strapped to the chest at a point below the collar-bone and above the third rib. In speaking, the chest muscles transmit the voice vibrations to the



Aviator Equipped with Telephone Set.

transmitter, thus enabling a telephone conversation to be carried on between the two occupants of the aeroplane.

It may be stated that the receivers and transmitters are connected by suitable cords which terminate in a small plug. As the aviator or passenger takes his seat, the plug is inserted in a jack mounted in the framework of the aeroplane. One of these jacks is provided for each occupant. The battery required consists of three standard telephone dry batteries which will provide continuous service for 100 hours without any appreciable loss of transmission quality.

It is pointed out that the simplicity and efficiency of this apparatus is sure to find favor among aviators, especially those engaged in the military branch of aerial work, modern aerial warfare having made it necessary that aviator and passenger be in communication at all times.

Consolidated Has "Qualified Toll Service"

Through District Manager H. H. Wiebel announcement is made by the Consolidated Telephone Company of Pennsylvania that Consolidated subscribers connected with the Allentown exchange can now receive "qualified toll line service," the actual physical connections having been completed a month ago.

This is a matter of great public interest and the Consolidated Telephone Company, a strong competitor of the Bell system, desires to have its position thoroughly and clearly understood. The Consolidated will not receive any portion of the toll revenue derived from "qualified toll line service," and, after careful consideration of the entire matter, decided to enter into this contract (under protest) merely in the interest of its exclusive subscribers desiring to talk to points not now reached by Independent toll lines.

As previously announced, Consolidated subscribers will be enabled to reach a great many points heretofore inaccessible to them. All points reached via the lines of the American Telephone and Telegraph Company, irrespective of the distance from Allentown, can be obtained by subscribers of the Consolidated Company at standard toll rates. This does not include service to points reached via the lines of the Bell Telephone Company of Pennsylvania within a fifty-mile radius of Allentown, such territory being restricted; however, Consolidated subscribers will continue to have access to all Independent telephones located within this area the same as heretofore.

Consolidated subscribers will also continue to receive toll service beyond the restricted area as previously supplied over Independent toll lines, and service will also be available to points on the lines of the Bell Teephone Company of Pennsylvania, known as "Bell points," and located beyond the fifty-mile radius at standard rates, plus a connection charge of ten cents.

In fact, beyond the fifty-mile radius it is possible to talk to all points reached by telephone. This arrangement so far applies only to subscribers connected with Consolidated exchanges at Carbondale, Scranton, Wilkes-Barre, Scranton, Johnstown, Reading.

Consolidated telephones will be available for incoming calls from either Independent or Bell stations located outside of the fifty-mile radius, and will continue to receive incoming messages from all Independent telephones and American Telephone and Telegraph points within fifty miles from the Consolidated exchanges listed above. It is probable that the new service will be extended to other exchanges in the Consolidated system within the near future.

Aeroplane for Line Repairs

An aeroplane was employed in the restoration of telephone service destroyed by the recent floods at San Diego, Cal. It carried a rope across the flooded district, and with the rope a telephone cable was hauled through the water, thus enabling a connection to be made between the broken lines.

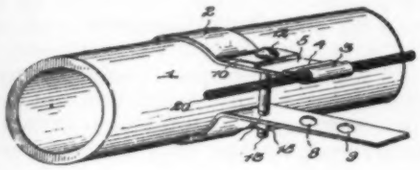
Telephone Patents Issued Recently

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

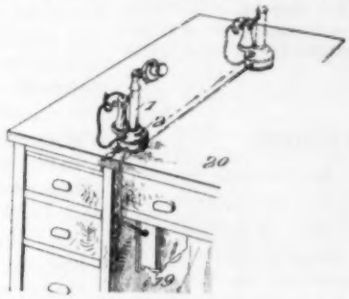
BY DAVID S. HULFISH

NO. 1,169,182. Thermionic Relay. Issued to A. McL. Nicolson, assignor to Western Electric Company, New York. The cathode surface is made active by heat radiation from an adjacent electrode.

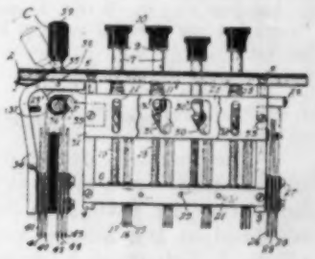
1,169,291. Ringing-Key System. Issued to F. M. Slough, assignor to Garford Manufacturing Company, Elyria, Ohio. In a cord pair for ringing party lines, the operator's key controls a local relay, and the relay applies the ringing current to the line, the relay having a local locking circuit so that the selection of a proper ringing current is maintained until the end of the connection.



1,171,142.



1,717,745.



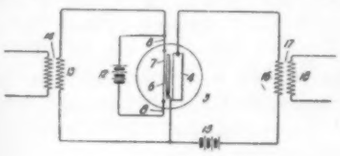
1,173,085.

1,169,320. Automatic System. Issued to W. W. Dean, assignor to Garford Manufacturing Company, Elyria, Ohio. (Application filed May 20, 1907.) The release magnet is inoperative until the called line has answered.

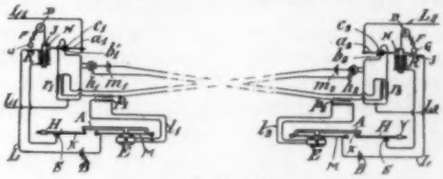
1,169,387. Repeating System. Issued to K. E. Ericsson, and G. W. Dahlstrom, Stockholm, Sweden. Two speech relays are arranged, one to repeat in each direction upon the telephone line, and local relays controlled by speech currents determine which of the two speech relays shall be operative.

1,169,736. Automatic System. Issued to Fred Schoenwolf, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Application filed December 16, 1908.) An arrangement of fast and slow relays for separating the groups of impulses from a call sender.

1,169,754. Automatic Selector. Issued to Fred Schoenwolf, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Application filed August 3, 1908.) In adusting the brushes, a guide member is adjusted to the desired selective position and the brushes then engage the guide member and stop. The engagement of the brushes and the guide operates the side switch.



1,169,82.



1,169,387.

1,169,799. Automatic System. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N. Y. An arrangement of fast and slow relays for separating the groups of impulses received from a call sender.

1,169,800. Automatic Release System. Issued to C. L. Goodrum, assignor to Western Electric Company, New York, N. Y. A slow relay in the front-contact circuit of the stepping relay is arranged to release the calling line if the stepping relay be charged too long.

1,169,890. Selector Switch. Issued to L. von Nagy, assignor to Western Electric Company, New York, N. Y. In a selector switch all sets of brushes are normally in position to engage their contacts when the switch is moved, and at each operation of the switch the brushes not needed are moved out of position.

1,169,894. Automatic System. Issued to H. G. Webster, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. The magnet which drives the brushes along the rows of contacts is the magnet which also effects release of the switch.

1,170,909. Automatic System. Issued to D. S. Hulfish, assignor to Canadian Independent Telephone Company, Ltd., Toronto, Canada. A calling line by its line relay indicates tens and units numbers separately, and a line switch then is adusted to those two indications, to pick up the calling line.

1,170,000. Insulating Enamel. Issued to F. A. Robinson, assignor to D. W. Armistead, Aurora, N. Y. Consists of a hardened preparation of the residuum of oil from a pinnipedic or cetaceous animal.

1,170,356. Transmitter. Issued to Harold Smith, assignor to George Kiorboe, Copenhagen, Denmark. That the carbon granule chamber may be filled at all times, a reserve chamber is provided, at a higher level, and enough carbon supplied to fill the speaking chamber and partially fill the reserve chamber.

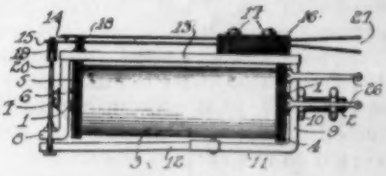
1,170,670. Relay. Issued to E. A. Reinke, assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. The return-pole armature is below the magnet spool, the switch springs are above the spool, and the connection is by a link across the end of the spool.

1,171,142. Ground Clamp. Issued to David Rosen, Philadelphia, Pa. The clamp band has two wings, and the clamping screw passes through the two wings to draw them together.

1,171,520. Call Sender. Issued to H. Hovland, assignor to Electric Company, New York, N. Y. The call sender has a holding a magnet and cannot send a signal until the magnet is released from the central office.

1,171,637. Process of Producing Copper-Clad Wire. Issued to W. M. Page, Philadelphia, Penna., and W. Tassin, assignor to Duplex Metals Company. During rolling processes the copper-clad billet is kept at about 1800 degrees, and above 1300 degrees until the billet is brought down to wire-rod size.

1,171,745. Attachment. Issued to G. P. Mundy. Washington, D. C. The desk telephone cord is attached to a spring reel which takes up the slack of the cord.



1,170,670.

1,172,365. Testing System. Issued to Aron Katz, assignor to Siemens & Halske, Berlin, Germany. The trunk lines in an automatic exchange are tested before connection is made, and the testing device subsequently is removed.

1,172,366. Automatic System. Issued to Omer Kirby, assignor to Automatic Electric Company, Chicago, Ill. The calling impulses are supplied from the central office, and the call-sender at the telephone operates to limit the number of impulses sent.

1,172,402. Automatic Trunking System. Issued to C. E. Stephenson, assignor to Automatic Electric Company, Chicago, Ill. In an automatic telephone exchange, a trunk may be seized at either end; a conductor acts as busy-test conductor, and when the trunk is seized at either end the busy-test conductor guards it against seizure at the remaining end.

1,172,539. Automatic Meters. Issued to J. W. Lattig and C. L. Goodrum, assignors to Western Electric Company, New York, N. Y. (Application filed August 29, 1904.) In a telephone system, the combination of automatic switches and of call regis-

ters in the lines, the switches being operated without operating the registers, and current for operating the registers being supplied as the connection is completed.

1,172,585. Selector Switch. Issued to H. F. Dobbin, assignor to Western Electric Company, New York, N. Y. The brush carriage carries several brushes, only one of which may be operative, the identity of the operative brush being dependent upon the position of the carriage. The carriage first is moved to determine the brush to be used, and then is moved to determine the selective position of that brush.

1,172,760. Call Distributing System. Issued to H. M. Bascom, assignor to American Telephone & Telepgrah Company, New York, N. Y. A telephone line has access to several operator's positions, and means is provided to cause the line to use the positions in rotation.

1,173,095. Party-Line Ringing Key. Issued to A. J. Carter, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. Four buttons for selective ringing are shown. Operating a selective ringing button restores the listening key to normal. Operating the general ringing key restores any selective ringing button.

The Tri-State's Good Report

The general prosperity of the Northwest, particularly that section comprising what is commonly known as the Twin City trade territory, is graphically reflected in the annual report of the Tri-State Telephone & Telegraph Company prepared by G. W. Robinson, president, and just issued by that company.

Several interesting and unusual features have been utilized by President Robinson in making up this report. One of these is found in a table in which commercial, municipal and general facts pertaining to Minneapolis and St. Paul have been handled as a single unit or commonwealth. The total population, for instance, of the two cities combined is estimated at 608,466.

For the year 1915, the total gross earnings of the Tri-State Telephone & Telegraph Company, exclusive of subsidiary and affiliated companies, is given as $1,741,099.73. This figure represents an increase of $92,133.59, or 5.58 per cent over the income of the previous year. Operating and general expenses, with current and deferred maintenance, aggregated $1,081,342.58, an increase of $29,434.57, or 2.8 per cent as compared with the year previous.

The net income, after deductions for all operating expenses and fixed charges, was $508,101.35, or an earning equal to 7½ per cent on the total amount of Tri-State stocks issued and outstanding December 31, 1915. Of this total net income, dividends on common stock were paid amounting to $240,000, and on preferred stock, $133,397.33. A total of $134,704.02 reverted to the corporate surplus.

Mr. Robinson has subdivided into four groups the telephone properties owned, operated and controlled by the Tri-State company, as follows: The exchange properties within the cities of St. Paul and Minneapolis; the exchange properties in other cities and villages; the long distance or toll line properties, and the subsidiary or affiliated companies.

These four groups represent a total investment of $9,410,265.15, of which amount the exchange properties in St. Paul and Minneapolis represent two-thirds, or $6,277,857.79. Long distance, or toll line properties, come second with respect to investment, with a total of $1,613,903.99.

During the past year two buildings have been constructed in Minneapolis and one in St. Paul which help materially to swell the grand total invested in land and buildings to $503,630. The new Center exchange in Minneapolis, to serve the business district, will cost, exclusive of equipment, $146,000.

During the year there has been expended, in additions and betterments to plant, a total of $1,016,034.35. Of this amount, $476,002.92 has been advanced toward the cost of replacement of manual by automatic equipment within the cities of St. Paul and Minneapolis.

The authorized capital is $10,000,000 equally divided between common and preferred stock. At the close of the year there was issued, and outstanding in the hands of 1,289 investors, stocks of the Tri-State company to the par value of $6,751,380, divided $4,519,000 in common and $2,232,380 preferred stock.

In addition there is yet outstanding in the hands of 311 investors, $151,230, par value, of the stocks issued by the Twin City Telephone Company, and assumed by the Tri-State Company in the purchase of the assets of the Twin City company. This stock may be converted at the option of the holder, into the preferred share of this company on a par basis; otherwise, it is subject to retirement by the Tri-State company in 1928.

The Tri-State Telephone and Telegraph Company has no direct bonded indebtedness, but, in the purchase of the properties of other companies, has assumed payment of their bonds. These underlying bonds, at the close of the year, aggregated $994,850.

With regard to the growth of the Tri-State company during the period of 10 years from 1906 to 1916 the report points out that the plant in service has increased from $4,500,000 to $9,000,000; the stations directly served from 18,384 to 54,544, with 350,000 connected stations. The annual gross earnings have increased from $870,000 to $1,741,000; there has been paid in dividends to stockholders $2,096,187.20 and surplus reserves accumulated during the 10-year period, aggregate $1,319,081.52.

Light Forest Service Telephone

A portable telephone, made of aluminum and weighing 2½ pounds, the invention of a forest officer, R. B. Adams of Missoula, Mont., will be part of the regular equipment of patrolmen on the National Forests the coming field season. This instrument is regarded as a great improvement over the set formerly used, which weighed ten pounds.

A field man equipped with this telephone, a few yards of light emergency wire, and a short piece of heavy wire to make the ground connection can cut in anywhere along the more than 20,000 miles of Forest Service telephone lines and get in touch with the headquarters of a supervisor or district ranger. To talk, one end of the emergency wire is thrown over the telephone line, the two ends are connected to the portable instrument, and the instrument is connected to the ground wire, the end of which must be thrust into the damp earth or in water. Contact with the line wire is made possible by removal of the insulation from a few inches of the emergency wire.

The Adams instrument does not ring the bell of the receiving telephone, but instead causes a screeching sound from a small megaphone-shaped apparatus known as a "howler." This instrument is installed at the ranger station telephone and is said to give effective notice that some one is on the wire. If the field man needs to talk with some one elsewhere on the line, the ranger station instrument can be used to ring up the person wanted.

MINNESOTA TELEPHONE NEWS

BY THE MINNESOTA INDEPENDENT TELEPHONE ASSOCIATION

326 McKnight Bldg., Minneapolis, Minn.

OWATONNA PHYSICAL CONNECTION CASE.

THE hearing before Commissioner Elmquist in St. Paul on the Owatonna Physical Connection Case was resumed on April 3, and concluded on the 6th, so far as taking evidence of the Northwestern Telephone Exchange Company is concerned. About 500 pages of testimony were introduced and the commission has yet to hear from the Tri-State Telephone and Telegraph Company, and the city of Owatonna. The case was adjourned until 10 a. m., May 22, at which time the Tri-State Company will give evidence and the city of Owatonna present part of its case. The final hearing will probably be held in Owatonna, when the city is to complete its evidence.

All testimony by the Northwestern Company came from its general officers at Omaha and was presented by G. H. Pratt, general commercial superintendent; A. S. Rogers, chief engineer; A. S. Kelly, general traffic superintendent, and A. A. Lowman, general superintendent of plant. Judge John I. Dille, general counsel, and E. A. Prendergast, its attorney, appeared for the Northwestern Company. C. B. Randall, secretary and attorney for the Tri-State Company, and Willis F. Sawyer, city attorney, assisted by A. L. Sperry for the city of Owatonna. There were also present during the hearing: J. W. Howatt, supervisor of telephones, and H. B. Warren, statistician of the commission; J. C. Kelsey of *Telephony;* G. W. Robinson, president, R. L. Barry, general superintendent, and J. F. McDermott, special representative of the Tri-State Company; M. L. Lane, division commercial superintendent of the Northwestern Company, and E. C. Kast, executive agent of the M. I. T. A.

APPLICATION OF THE COMMERCIAL TELEPHONE COMPANY TO INCREASE ITS LOCAL EXCHANGE RATES AT BELGRADE.

Application has been filed by the Commercial Telephone Company, in which it proposes to give a continuous service, including holidays, and discontinue making a charge of 25 cents per call for service between 9 p. m. and 7:30 a. m., and in order to secure a reasonable return on its investment it is necessary to increase its local exchange rates as follows:

PRESENT RATES	
Individual Line, Business	$1.50 per month
Individual Line, Residence	.75 per month
Rural Switching, per Station	.10 per month
PROPOSED RATES	
Individual Line, Business	$2.00 per month
Individual Line, Residence	1.00 per month
Rural Switching, per Station	.25 per month

Also to establish a toll rate between Belgrade and Brooten of 15 cents for three minutes and 5 cents for each additional minute.

A hearing by the Railroad and Warehouse Commission was announced to take place in the Town Hall at Belgrade on the 25th day of April at 10 a. m.

ASSOCIATION NEWS ITEMS

GRAND RAPIDS: The Bustitown Farmers held a telephone meeting recently and elected officers as follows: President, Orrin Patrow, secretary, Arnold C. Lowerman, treasurer, B. R. Merrifield.

VICTORIA: The farmers in the vicinity of this place are talking of organizing a telephone company with headquarters at Victoria.

SMITHVILLE: The Duluth Telephone Company has a crew of men at this place stringing wires and connecting telephones.

BAUDETTE: The Warroad Telephone Company is planning on building a line from here to Wheeler's Point on the Lake of the Woods in the spring.

MERRIFIELD: Articles of incorporation have been filed for the Mission Lake Rural Telephone Co., with a capital stock of $5,000. W. Hunt, F. W. Howe, A. C. Taylor, C. Faupel and others are the incorporators.

ALBANY: The Southeast Telephone Company of this place has elected Paul Obermiller, president, and Math Heinen, treasurer.

HARWICK: Nelson and Benson from Jasper have been repairing the lines and fixing up the local telephone system during the past month.

PINE RIVER: C. E. Easton of Pequot has recently purchased the Pine River Telephone Exchange.

BRAINERD: The Tri-State Telephone Company is about to install an automatic fire alarm system in this city which will operate in connection with their local exchange.

BASS LAKE: At the recent annual town meeting, the sum of $325 was voted to be used towards installing telephone lines in the vicinity in a North and South direction.

CAMPBELL: The Western Co-operative Telephone Company is about to ask for bids for buiilding several rural telephone lines which will include about 500 poles, brackets, cross arms and the stringing of wire, starting from the west limits of Fergus Falls into the township of Western. H. G. Dahl at the Fergus Falls National Bank is looking after the details while Fred B. Swift is secretary, R. F. D. No. 2, Campbell.

AITKIN: Some of the farmers are planning to build a rural telephone line this spring to run from Palisade to Swann River.

MOUNTAIN IRON: There has been considerable complaint about the telephone rates and service at the place and a committee consisting of G. A. Paulie, J. F. Muenenlwand and others were appointed to see what could be done to better it.

REMER: A new rural telephone line is being planned for this spring. The line will run through the town of Slater.

MELROSE: The Melrose Telephone Company has just been incorporated with a capital stock of $40,000. A. H. Kraker, president, G. F. Speechley, vice president, and A. E. Kraker, secretary and treasurer.

MORA: The directors of the Kanabec County Mutual Telephone Company recently held a meeting and decided to purchase a car load of poles in order to rebuild some of the present lines and for extensions.

NEVIS: The following officers were recently elected by the Nevis Telephone Company: President, Swann Rodin, vice president, Abe Lewis, secretary and treasurer, J. H. Halvorson.

AITKIN (Spencer): The farmers of Spencer are planning to build a rural line to connect with the Aitkin-Deerwood System.

BEAR RIVER: The following directors were recently elected at the annual meeting of the Bear River Valley Rural Telephone Company: J. A. Wesling, A. A. Olson, and Curtiss Bartlett.

BEMIDJI: The Narry Telephone Company through its officers has asked the merchants of Bemidji to assist in building a line into that city.

CROSBY: The Commercial Club of Crosby is agitating the reduction of local rates.

ST. PAUL PARK: The Northwestern Telephone Exchange Company is making some extensive improvements in its lines at this place.

ELLENDALE: The Ellendale farmers telephone company will make several improvements in its lines this spring.

NEW ULM: The New Ulm Rural Telephone Company has decided to erect a two-story brick central office building at the corner of German and Second streets North.

FERGUS FALLS: The Dent-Star Lake Telephone Company has just been incorporated with a capital stock of $4,500. President, H. E. Meader, vice president, Warren Rice, secretary, William Tenter.

Cosmos (R. F. D. Buffalo Lake): The Litchfield Telephone Company is planning on building a new line from Litchfield to take care of the business in this vicinity in the near future.

Springfield: Paul Christenson of Clements, Minn., has been appointed manager of the Farmers & Merchants Mutual Telephone Company, succeeding Bert Dunn.

Hackett: The farmers in this vicinity expect to construct a telephone line this spring.

Campbell: J. W. Moffsinger has started a movement to have the farmers' telephone lines install a central at Campbell.

Holt: The North Holt Telephone Company recently held its annual meeting and elected the following officers: President, August Ness, vice president, John Mangus, treasurer, H. A. Fosholm.

Kerkhoven: The following officers were recently elected at the annual meeting of the Manre and Pillsbury Telephone Company: President, Edward Egerstrom, vice president, Albin Broberg, secretary, H. Johnson.

Woodstock: At the annual meeting of the Woodstock Telephone Company, the following officers were elected: President, G. J. Mooney, vice president, J. B. Feyereisen, secretary, George Moline.

Tyler: The following officers were recently elected at a meeting of the Tyler Telephone Company: President, Hans Lauretsen, vice president, Phil J. Ehret, secretary, S. H. Oxholm.

Winthrop: At the recent annual meeting of the Peoples Independent Telephone Company, the following officers were elected: President, C. M. Peterson, vice president, Peter Espenson, secretary and treasurer, A. A. Larson.

Walker: A new switchboard and other equipment for the extension of lines of the local exchange has recently been purchased.

Kiester: Oscar Johnson has sold the Thompson Telephone Exchange to the Western Electric Telephone Company of Mason City, Ia., which company will continue to operate it.

Wendell: At the recent annual meeting of the Wendell Telephone Company the following officers were elected: President, T. A. Boyd, secretary and treasurer, C. A. Prestrud.

Albany: The following named farmers will jointly build a telephone line this spring: J. C. Schwinghammer, Martin Falkner, Joseph Tomsche.

Brainerd: The farmers of the Mission Lake Country recently held a meeting to organize and incorporate a new rural telephone company. They are planning to run lines north from Brainerd to Merrifield.

St. Paul: E. G. Lawrence, who has been representing the Kellogg Switchboard & Supply Company in Minnesota for a number of years, has taken the position of manager of telephone department for the Northwestern Electric Equipment Company of St. Paul, which firm has just completed arrangements for the exclusive agency of Kellogg apparatus for trade territory. We wish Mr. Lawrence the best of success in his new position.

Bertha: The farmers south of here held their annual telephone meeting a short time ago and elected the following officers: President, J. F. Dietel, vice president, Leo Ellig and secretary, John Stork.

Kingston (R. F. D. Dassell): At the recent annual meeting of the Kingston Central Telephone Company the following officers were elected: President, T. A. Nystrom, vice president, H. C. Jenson, and secretary, G. G. Robinson.

Public Utility Commission News

Reports Cancerning the Activities of State Regulating Bodies in the Telephone Field

Massachusetts

THE PUBLIC SERVICE COMMISSION of Massachusetts has issued an order which requires the New England Telephone & Telegraph Company to reduce its charges for extension telephones installed at measured-service stations and not used in connection with private branch exchanges, to a rate not greater than $4 per annum. The order became effective April 20. The present rate for extension phones is $6 per annum except in connection with unlimited business service in the Boston central district, where it is $9. The Automatic Telephone Company of New Bedford has similar rates, but these are not affected by the order.

The commission made an exhaustive investigation of the subject of extension sets, under a legislative act of 1915. A report of the hearings was published in Telephone Engineer for February, 1916.

In justification of present charges the New England Company contended that (1) other companies' rates are no less, and in some cases higher than its own; (2) that such charges have been approved by public service commissions of other states; (3) that present charges are, on the whole, below cost plus a reasonable return and (4) that its present rate schedule has been worked out with great care as a well-balanced whole and no rate should be disturbed unless clearly unreasonable.

The Massachusetts Commission says the first contention is true except in the case of the New York Telephone Company, which charges in connection with private branch exchanges $6 per annum for the first 10 instruments, $4.80 for the second ten and $3.60 for each additional instrument.

The company submitted at the hearings the results of a study of 600 cost sheets purporting to show average investment, including installation, of $7.92 for a set. This included an apportionment of working capital, 80 cents, and investments in supplies and general equipment, 2 and 11 cents, respectively. The commission objects to the former, saying the company's accumulated surplus of more than three and a half millions "seems quite sufficient to provide all the working capital which it needs."

The cost of apparatus and installation is challenged by the commission, which points out that factory prices for the receiver, transmitter and induction coil presented by independent manufacturers, are 50, 80, and 25 cents, respectively, compared with $1.14, $1.50 and 34.5 cents, given in by the telephone company. The discrepancy between $1.55 and $2.985 is very great, it says.

The company introduced figures to show average annual plant costs, traffic costs, commercial and general costs, which with 7 per cent on investment amounted to $6.89. The commission objects to these figures on the ground of failure to distinguish between main stations and extensions, the Telephone Department being of the opinion that the cost of installing main stations is about twice as great as for extensions.

The New England company estimated the life of apparatus at 10 years, but an investigation in Chicago showed a life of 15 years.

The commission holds that the computation of 7 per cent interest, 10 per cent depreciation and 1.7 per cent taxes upon the estimate ($2.985) of what the receiver, transmitter and coil would cost if bought instead of leased, and 20 cents for repairs, is "fallacious."

The repairing is done by the lessor company,

and is a mere guess. The rental is based on gross receipts, and extension sets can add to the rental charge only as they add to gross receipts. At $6 per year, the rental charge of 4½ per cent amounts to 27 cents, not 75 cents per instrument claimed by the company.

The commission says the data on which a 25 per cent estimate of increase to normal number of calls caused by extension sets, is not wholly convincing. It is admittedly unfair to include this apportionment of traffic expense in case of measured service. If a subscriber to such service exceeds his number of calls, due to the extension, he pays for the extras. In the case of unlimited service the company's claim is more reasonable.

The annual "commercial cost" of 75 cents included the cost of directory, 34 cents, and expenses of administration, accounting, collection, advertising and the like, 41 cents. The commission says the apportionment (in the ratio of revenue per extension to total operating revenue) is purely arbitrary. Practically, there seems no clear reason why extension sets should add to this expense. "General costs," 34 cents, is open to like objection.

The commission holds that the 55 cents apportionment for return on investment is not an expense but a profit. It is figured at 7 per cent on total estimated investment, including working capital and allowing nothing for depreciation on investment. "The total investment of the company in fixed capital (not including the investment in securities of other companies or deducting depreciation), plus the two million dollars allowance for working capital, was $70,448,537.13 on June 30, 1915. A 7 per cent return on this investment would amount to $4,931,397.60. Adding the $275,702.78 of non-operating income during that year, and deducting all interest and rental charges, amounting to $902,157.71, leaves $4,304,942.67, or very nearly 10% on the capital stock of $43,261,200."

In its conclusions the commission says that its investigation leads to the belief that present rates for extensions are productive of large profit to the company, especially in connection with measured service. The figures submitted, representing investment and annual expense, are "considerably higher than the facts justify." Extension sets add to the convenience of the subscriber but not to his service, the number of messages he is able to send or receive is not thereby increased. So far as traffic costs are concerned, it can make no conceivable difference to the company whether added calls are made through an extension or a main telephone. "In case of unlimited service, it is perhaps reasonable to assume that the service rate is adjusted to the normal use of a single instrument and that the charge for an extension set should include some compensation for the additional burden which such an instrument may impose upon traffic." Extension sets are, from one point of view, a distinct advantage to the service and tend in an important respect to decrease expense, i. e., by expediting service.

The reasons why the Commission requires no change in charges for sets used in connection with private branch exchanges are that subscribers to this type of service are able to secure the maximum of benefit from widespread telephone connections and that this phase of the subject may well be left for study in connection with a general telephone inquiry.

At a recent hearing of the Public Service Commission of Massachusetts, independent manufacturers of apparatus objected strenuously to present conditions, which unfairly limit their market. These manufacturers contend their instruments are as efficient as those made by the Western Electric Company for the New England Company. Owners of buildings in which these systems are installed are not now allowed to connect with the New England Company's lines.

The commission asks: "Is it in the public interest to permit a company which enjoys a monopoly of the telephone service in a particular territory to extend its monopoly into the field of manufacturing by granting to one company, without competition, the exclusive privilege of furnishing telephone apparatus and supplies in general? If such a situation is not in the public interest, it could be cured, conceivably, through legislation such as the independent manufacturers suggest, or the telephone company could be required to make its purchases in the open market after securing competitive bids upon proper specifications.

"On the other hand, it is no doubt possible that the telephone company may be able to demonstrate its claim that the existing apparatus produces, on the whole, the most economical results and is, in other respects, in the public interest. As yet it has not had the opportunity."

It is considered wise to defer the question for future action.

Illinois

Garrison Babcock of Chicago has been retained by the city of Peoria to represent it in the telephone rate revision case of the Central Union Telephone Company.

The Public Utilities Commission of the State of Illinois states that the Mississippi Valley Telephone Company has applied for permission to raise the rates on users of phones in Dallas City, which will affect residence phones from 25c to 50c per month, and business phones from 75c to $1 per month. Farmer phones will be at least twice what they are now. Dallas City and all the farmers connected with Dallas City central are vitally interested in this matter.

The hearing of the petition of the Vermilion County Telephone Company before the State Utilities Commission at Springfield, scheduled several weeks ago to come before the body Thursday, has been postponed until May. The delay of the telephone company in placing its exhibits before the board until two or three days ago, is one of the reasons for the postponement.

Counsel for the Independent telephone companies downstate yesterday opened a vigorous fight before the state public utilities commission to prevent the ratification of the sale of the Automatic telephone company to the Chicago Telephone Company.

The protest against the sale was based on the declaration that it was only through the automatic concern that these independent companies could connect their subscribers with service in Chicago.

At the same time another angle of fight on the sale was instituted by Attorney Fayette S. Munro, representing the Public Ownership League, who declared the real buyer to be the A. T. & T. Company.

New Jersey

The State Board of Public Utility Commissioners started an inquiry, April 26, 1916, into the rates charged by the Bell interests, New York Telephone Company and the Delaware and Atlantic Telegraph and Telephone Company. The inquiry will be a sweeping one and will cover the entire state, as the New York Company covers North Jersey and the other corporation operates all through South Jersey.

The board stated today that it has had in contemplation for some time the investigation of the rates of these two companies, but has been without the necessary funds to meet the expenses of the probe. The Legislature has allowed an additional appropriation of $10,000 to the board, and it proposes to use the sum so given for this purpose, the appropriation being directly in response to a request from the board for an allowance which would enable it to investigate the rates of these companies. Many patrons of the Delaware and Atlantic company in Trenton and the South Jersey territory have had their rates raised, the plea of the company being that many telephones were being operated under an old rate that was less than the standard charge, and the increase was merely bringing all telephone rates up to the standard charge.

Oregon

The complaint recently filed with the Public Service commission by the Home Telephone company, of Albany, asking for an increase in the telephone rates here for both competing companies, is causing considerable agitation here, especially among the business men. There is a general feeling that, should the rates be increased, many telephones would be taken out.

Colorado

The state public utilities commission, second week in April, dismissed a complaint filed by citizens of the towns of Pierce and Ault, Colo., in regard to a consolidation of the telephone exchanges in the two cities. A ruling was made that this matter was one of district service and therefore should be considered together with the general telephone hearing now on before the commission.

Citizens of Ault desire a consolidation of the exchanges to afford their district better service. The Pierce Commercial club objects to the removal of the exchange from that city.

Maryland

Reasons setting forth why Baltimore should have a lower telephone rate were contained in a petition submitted Apr. 5, 1916, to the Public Service Commission by the Protective Telephone Association, through its counsel, H. Findlay French. The commission recently ruled that there was no reason why the telephone rate should be reduced, basing the decision on a state-wide investigation that covered years. This new petition is based on permission granted to any locality by the decision handed down by the commission last month to ask for a rehearing. It is voluminous and makes plain the reasons why the association holds that Baltimore is being discriminated against by being forced to use the present rate.

The principal point is that the Baltimore rate should be based on telephone property in the city.

At present the company's profits are 12 per cent per annum in the city.

Idaho

The public utilities commission handed down an order and opinion late yesterday on the complaint of the city of Coeur d'Alene versus the Interstate Utilities company, which the commission orders dismissed without prejudice. The complaint charged that the defendant company had no valid franchise from the city authorizing it to do business within its limits; that the rates were unreasonable, exorbitant and excessive and that by reason of such rates some patrons had discontinued the use of their telephones. The defendant company admitted in reply to the complaint that the service has been bad, but gave as the reason the overhauling of the switchboard and the remodeling of the entire central station equipment.

"This commission does not wish to be understood as finding and determining that the valuation of the defendant's plant at Coeur d'Alene, as herein assumed, to-wit: the sum of $81,251.48, is the true and correct valuation for rate making purposes. In no event could the amount be less than that amount, but as hereinbefore stated, for the purpose of this case only, we have assumed that that valuation is the reasonable valuation of this plant for rate making purposes.

"From all the evidence in this case, the commission finds that the rates, tolls, rental and charges of the defendant company at Coeur d'Alene are not unreasonably high and exorbitant and that the complaint of the plaintiff herein should be dismissed without prejudice."

Kansas

Representatives of mutual telephone companies in Kansas formally protested in April to Governor Capper against recent rulings and regulations made by the Kansas public utilities commission which they say "have embarrassed, handicapped and increased expenses" of their companies. The complaint was signed by J. B. Shields of Lost Springs, president, and M. H. Rice of Delphos, secretary-treasurer of the Kansas Mutual Telephone Association.

Governor Capper stated that he could not interfere or seek to dictate to the commission.

"That mutual telephone companies, for the purposes of this act, shall be understood to mean any cooperative telephone company operating only for the mutual benefit of its subscribers without profit other than in the service rendered."

Under the commission's interpretation the Delphos company, managed by Mr. Rice, secretary of the association, is filing its rates and annual reports with the commission. For the fiscal year 1915 its report shows 163 members of the association, and 575 subscribers. Its operating revenues totaled $7,369.02, of which $876.46 was from toll service.

By a stipulation filed early in April with the public service commission, the Lond Distance Telephone Company of Kansas City takes over the exchange and other property of the Clay County Telephone Company at Excelsior Springs.

Under the terms of the stipulation the Kansas City company is to file with the commission as soon as it can be prepared a schedule calling for a rate of $2.50

per month for business telephones and $1.25 for residence telephones, in Excelsior Springs.

Some weeks ago the company filed a schedule for Excelsior Springs calling for a schedule of rates of $3.50 per month for business houses and $1.75 for residences.

This schedule is withdrawn as usual under the stipulation carrying the merger of the two exchanges.

S. D. Flora, weather observer, and others living inside the city limits of West Topeka, but west of Shawnee street, are to have four party line service restored them by the Missouri & Kansas Telephone company in Topeka, it was announced on April 18 from the offices of the Kansas Public Utilities commission.

The United Telephone company, of Abilene, has made application to the public utilities commission for an increase in the capital stock of the company, $117,500, the money from the sale of stock is to be used in purchasing the telephone exchanges of Clay Center, Stockton and Hays City.

The members of the utilities commission were in Clay Center, April 15, to consider the case of R. B. Trechel, against the Union Pacific Railway company, and went to Belleville the following day to investigate the application of the Citizens' Telephone company to file new rules and rates.

An application from the Whitewater Telephone Company, by J. D. Joseph, secretary, for an increase of 25 cents a month rental charge, was filed some time ago with the commission.

It seems that Senator Joseph brought his ledger along in presenting his claim for increased rates. And the ledger showed $5,745.24 bills not collected. It also showed that the company had been paying quarterly dividends. In an order issued yesterday the commission ruled that the company spend sixty days trying to collect its bad accounts. Furthermore, it was ordered that the company cease paying dividends "until the books and records actually show a profit legally earned" sufficient to justify the dividends. At the end of sixty days the company is to report progress to the commission.

Permission was granted the Butler County Telephone and Electric Co., of El Dorado, to sell its exchanges and toll lines and other property to the Missouri & Kansas Telephone Co., for $80,000 in cash. The Butler county company had telephone lines and exchanges covering Butler, Sedgwick, Marion and Cowley counties. The Kansas Public Utilities Commission also issued an order authorizing the Langdon Telephone Company to remove its knife switch device from all its lines.

The Citizens' Telephone Company, of Belleville, will be allowed to increase its rates, but cannot put in force a regulation penalizing subscribers 10 cents a month for delay in settling accounts. This was the gist of an order issued yesterday by the Kansas Public Utilities commission. The increases that will be allowed, when the company files an amended petition, are 15 cents a month on residence desk phones, and 25 cents a month increase on business desk phones.

The Wilsey telephone got permission to increase its rates from $1.25 to $1.75 a quarter. An order was issued yesterday allowing an increase to $1.50. The commission also allowed the sale of the J. D. Barmore interests in the telephone plant at Hugoton to M. E. Hamby, W. W. Hayward and T. G. Hicks.

Interstate Commerce Commission

At a general session of the Interstate Commerce Commission, held at its office in Washington, D. C., on the 10th day of April, 1916, the subject of monthly reports of revenues, expenses and capital changes of telephone companies being under consideration:

It is ordered, That each and every telephone company subject to the provisions of the Act to regulate commerce having annual revenues above $50,000 shall, beginning as of January 1, 1916, make and file, in duplicate, with this Commission monthly reports of revenues, expenses and capital changes; that said reports shall be in forms prescribed and furnished by the Commission for that purpose and in accordance with the instructions in such forms.

It is further ordered, That each of said companies shall mail its monthly reports as aforesaid to the Division of Statistics, Interstate Commerce Commission, Washington, D. C., within forty days after the close of the calendar months severally covered by the reports made.

By the Commission:

(Seal) GEORGE B. MCGINTY,
Secretary.

Iowa

Judge Ransier, representing the Citizens Gas and Electric Company and the Cedar Valley Hydraulic Company of Waterloo, appeared recently before the Iowa railroad commission asking for seven franchises for electric lines extending into every county around Waterloo. One objection was filed. The rural telephone lines operating out of Charles City protested.

The most of the lines under consideration have been constructed and are now in operation. They were built under authority granted by the board of supervisors. The company now seeks a state franchise so as to doubly secure its rights. Several million dollars will be invested in the completed project, Judge Ransier said.

Indiana

The hearing before the Indiana Public Service Commission on the petition of the Indianapolis Telephone Company, the New Telephone Company and the New Long Distance Telephone Company for permission to effect a merger of those properties, was completed April 20, except for the filing of certain cost records, which will be done in a few days. The commission did not indicate definitely when a decision will be announced, but Thomas Duncan, chairman, said the ruling will be made as soon as possible.

The figures, yet to be presented, will show the exact amount paid by each of the companies for stock in the others. Charles S. Norton, secretary of the Indianapolis Telephone Company, agreed to prepare the figures for the commission as soon as possible. He was unable to give the exact amounts without looking up the records.

The three companies have been operating practically as one concern, and the authority for a formal merger is being sought, it is stated, in order to organize the independent telephone lines of the state more completely.

At the beginning of the hearing Edward L. Cline,

general manager of the telephone companies, testified that the reproduction value of the plants seeking the merger is $2,864,316, exclusive of outstate plants, the stock of which is owned by the local companies. Mr. Cline told the commission that the companies are prepared to install 7,000 more telephones in the Indianapolis territory without further cost than the actual price of the instruments.

Arizona

A hearing was held April 16 in the case of the Mountain States Telephone Company, who petitioned for the cutting out of discriminations in phone rentals in the city. In the evidence it was brought out by the company that although they were earning 4½ per cent on their physical valuation, this did not include $112,000 spent for improvements since 1914. Statement held over.

Oklahoma

An order was issued by the corporation commission Wednesday granting permission to the Pioneer Telephone and Telegraph Company to increase its rates on business telephones from $2 to $2.50 a month after the completion of the installation of a modern common battery telephone system.

No increase was asked on residence telephones. The business men of the city agreed to the raise in consideration of the improvements the company has agreed to make in its plant and its service.

Wisconsin

Disposition was made of five telephone cases by the Wisconsin railroad commission the last of April. Authority to increase its rates from $6 to $9 per year was granted by the commission to the Beef River Telephone Company, operating an exchange at Osseo. The commission found that the present rate of $6 per year was not sufficient to keep the lines of the company in repair.

A change in rates was also authorized to the Feely Pike Lake Telephone Company, which operates a single full metallic line approximately 20 miles long connecting the Pike Lake summer resort with lines of the Glidden Telephone Company and the Wisconsin Telephone Company, at Fifield. During the past year this company has changed from a grounded to a full metallic line at great expense. The commission authorizes a rate of $2.50 per month for public and private summer hotels, resorts and cottages. The rate for rural subscribers shall be $1.50 per month and non-subscribers will be charged 15 cents a call.

An increase in rates was authorized for the Baldwin Mills Telephone Company, which operates a rural telephone system between Weyauwega and Waupaca. Heretofore these subscribers have been charged $1 a month or $12 a year for service to these two cities. It required one-half of the money collected to pay the Weyauwega Telephone Company, and the Wisconsin Telephone Company, to perform switching services. Where the service to the two cities is to be maintained a rate of $15 a year is authorized.

Slight changes are made in the switching arrangements between the Hawkins Telephone Company, the Westford Telephone Company, and the Badger Telephone Company, as they apply to the Hub City switch. These changes affect mainly the times for the settlement of accounts. They become effective July 1, 1916.

The application of the Watertown Telephone Company for an increase of rates was dismissed.

Milwaukee telephone rates will be reduced approximately 10 per cent by order of the railroad commission in its decision in the phone rate case. The petition for a reduction of rates was filed six years ago by Peter Bogart and other citizens. The city later became a party to the action by order of the common council. Final hearings were held at the city hall last fall, ex-Assistant City Attorney Max Schoetz representing the petitioners.

The reductions provided for in the order follow: One-party unlimited business service, from $96 to $87 per year; one-party measured residence service and two-party unlimited residence service, from $36 to $33; one-party measured business service, from 15 cents per day for three calls and 3½ cents for each additional call to 13½ and 3 cents; two-party nickel business service, from 10 cents for two calls per day and 4 cents for each additional call, to 9 and 3 cents; four-party nickel business service, from 7½ cents per day for one and one-half calls and 5 cents for each additional call to 6¾ and 3 cents; one-party nickel residence service, from 10 cents per day for two calls and 3½ cents for additional calls, to 9 and 3 cents; two-party nickel residence service, from 7½ cents per day for one and one-half calls and 4 cents for excess calls, to 6¾ and 3 cents.

The four-party residence service rate remains at 5 cents, but a reduction to 3 cents for excess calls is provided for. The company will be authorized to discontinue its four-party unlimited residence service for which it gets $30 per year and substitute a measured service at $24 per year.

The commission fixed the valuation of the property as of Dec. 31, 1914, as $5,350,000. Upon this valuation it held that the company should be entitled to earn approximately 8 per cent, after making adequate allowance for depreciation. The commission pointed out that the cost of capital in the telephone business has often been from 7 to 9 per cent. For depreciation the allowance fixed by the commission amounted to 5 per cent of the valuation of the property, although a computation on the 2 per cent sinking fund basis showed that a similiar smaller allowance would be sufficient if a table of average lives of telephone equipment could be accepted in all cases.

Nebraska

The application of the Hartigan, Nebraska, telephone company for a flat increase of 25 cents per month per phone was taken under advisement after a hearing held Tuesday morning at Lincoln by the state railway commission.

The company was represented at the hearing by Manager J. D. C. Smith and the city by Mayor Walz.

The application was decided upon at a meeting of the stockholders held in January, 1915, and was presented to the commission some time ago, but the press of other business prevented an earlier hearing.

The present rates were fixed in the city ordinance passed at the time the franchise was granted, and the city officials contend that they can be changed only with the

consent of the city. The company informally takes this view also.

The state commission contends that the adoption of the constitutional amendment establishing the commission automatically placed the rate question in the hands of the commission. The question will be heard by the supreme court on April 17, when it is expected to decide a similar case from Polk county.

The commission has authorized the Milburn-Anselmo Telephone Company of Custer county to increase rates at Merna on business phones 25 cents per month, while residence phones are reduced the same amount. Rural subscribers will be required, under this order, to maintain their own telephones hereafter, and will pay a switching rate of 50 cents per month, instead of the regular rental charge of $1 made by the company when it furnishes the phones and keeps them in working order.

Ohio

The State Utilities commission today instructed telephone expert T. E. Green to make a physical valuation of the two telephone companies at Niles and Warren. This is preparatory to a hearing on the application of the Warren and Niles Telephone company to buy the Central District Telephone plant at Warren for $33,800 and to sell its plant at Niles to the Central District for $21,000. If allowed two systems will be done away with and there will be interchange of service.

Details of the exchange of property of the Coshocton County Telephone company and the Citizens Telephone company of Coshocton, authorized by the state public utilities commission, were made public this month.

The County Telephone company gives to the Citizens Telephone company $1,575 in cash and its Plainfield exchange, and receives in return the following toll lines: Coshocton to Warsaw-Nellie-Mohawk-Walhonding to county line; Walhonding to New Castle-East Union-West Carlisle-Cooperdale-West Bedford-Tunnel Hill; Cooperdale to Dresden; Coshocton to Keene; Coshocton to Bloomfield, and Warsaw to Spring Mountain.

The claim of the Citizens against the County was $3,500, and this is considered liquidated as the Plainfield exchange is valued at about $2,000.

The commission ordered both companies to file as soon as possible schedules showing inauguration of new service and withdrawal of the old service.

Mayor G. N. Leasure, of Delphos, has been in Columbus, relative to the granting of a petition asking for the issuance of $25,000 of stock by the Delphos Home Telephone company. He was to interview the state utilities commission, through which body the grant must come, but the hearing was not held April 13, as was originally scheduled. The additional stock is necessary to build the new building to house the company and to provide for the equipment of the new plant.

New York

The up-state Public Service Commission has announced that it will conduct an investigation of the short term contracts and contracts terminated before expiration in force by the various telephone corporations throughout the state. May 10 has been set for the first hearing in the matter. From time to time complaint has been made to the Commission by telephone subscribers in various parts of the state against charges for telephone service for less than a year, such as service at summer homes, and as to the penalty exacted by the companies when contracts made for the year are canceled in less than that time. The last of these came from New Rochelle and at that time the Commission, in dismissing the complaint, made a promise of an early investigation of the whole matter, which promise is now being fulfilled.

On May 10 the Bell and the various Independent companies will be afforded opportunity to sumbit evidence as to the reasonableness and justice of the charges under investigation. Following this the Commission's own division of telephones and telegraphs will make an investigation of the situation and report to the Commission on the evidence thus submitted. The Commission hopes to clear the matter up before the summer.

Missouri

That arguments in a case of the City of Joplin against the Home Telephone Company will be heard by the Missouri public service commission in Jefferson City May 1, was announced in a statement that was received by E. F. Cameron, city attorney, from T. M. Bradbury, secretary of the commission.

The telephone company has applied to the commission for consent to a permanent increase in its rates.

New Mexico

A complaint against the rates and service of the Taos Telephone Company, recently filed with the state corporation commission by Edwin J. Forde, editor of the Taos Recorder, has brought letters of protest from P. V. Deickman, manager of the company, and several other Taos residents. Mr. Dieckman indicates that the company is not now paying expenses, and that it is giving the best service possible under the circumstances. In his complaint Editor Forde said the company's toll rates were equivalent to a charge of two cents a mile, and stated that while the company, by building only a mile and a half of line could secure through connection with Las Vegas and Santa Fe, it persistently refused to do so. The case is being investigated by the commission.

Texas

No action was taken by the County Commissioners' Court yesterday afternoon on an application of the Texas Telephone Engineering Company for a franchise for Vickery. The application as presented several weeks ago provides that rates charged shall be the same as those of the Southwestern Telegraph and Telephone Company in Dallas and that the service shall include local service in Dallas. Commissioner J. T. Miller said he would recommend granting of the franchise after an additional clause shall have been added nullifying the grant if the provision as to rates and Dallas service should be carried out.

On March 31 the Chicago Telephone Company had 422,500 telephones in service in Chicago, an increase over March 31, 1915, of 33,860; in the suburbs, 94,500, an increase of 7,040. The total increase was 40,900. The net gain the first quarter of 1916 was 34 per cent, while in the first quarter of 1916 it was 51 per cent.

Chicago Merger Situation

Concerning the sale of the Automatic Telephone Company to the Chicago Telephone Company before the Public Utilities Commission Ralph M. Shaw, attorney for the Illinois Tunnel Company, the seller, stated that the American Telephone & Telegraph Company of New York is principal purchaser, and that the price to be paid is $7,772,192.

Of this sum, $5,536,192 is to be paid by the New York concern, and $2,236,000 by the Chicago Telephone Company, acting as agent for the foreign corporation.

Objections to the sale were urged with considerable force by means of many intervening petitions.

Claiming the support of prominent packers, Augustine J. Killen, an auditor, with offices at 162 North Dearborn street, appeared with an intervening petition signed by a dozen or more names, and asked that the sale be stopped and physical connection be established between the two telephone companies.

Fayette Munro, for the Public Ownership League, subpoenaed the books and records of the Chicago Telephone Company since 1913 pertaining to dealings and contracts of that concern and the Automatic Telephone Company.

Attorney Shaw moved that the petition of the Public Ownership League be thrown out, as the league has showed no property interests in the question; but Attorney Munro interposed.

"The Public Utilities Commission is not a court of law," he said. "It was created along the lines of public welfare. I insist that the commission has the right to make the real companies concerned in this deal come before it.

"I find that the American Telegraph & Telephone Company owns 97.59 per cent of the stock of the Chicago Telephone Company. I also find that the Chicago Utilities Company owns the stock of the Illinois Tunnel Company and the Illinois Telephone & Telegraph Company.

"We are seeking to find out what the Chicago Utilities Company is. It has never filed a report with the Secretary of State, Stevenson, or with this commission. It is a joke. A company owning and operating sixty miles of telephone lines and tunnels in the City of Chicago does not comply with the laws of the state of Illinois."

Fearing that the sale would deprive them of long-distance telephone connections into Chicago, representatives of smaller Independent companies were present to protest the sale. Among them were F. B. McKinnon, representing the United States Independent Telephone Association; O. F. Berry, general counsel for the Illinois Independent Telephone Association; Frank O'Hare and Philip L. Miller of Decatur, representing the Kinloch-Bloomington Telephone Company, the Wabash Valley Telephone Company, and the Citizens' Independent Telephone Company of Terre Haute, Ind., and B. A. Campbell of East St. Louis for the Kinloch Long-Distance Telephone Company.

Merger Talk in Los Angeles

The management of both the Bell and Home Telephone Companies in Los Angeles, Cal., are engaged in working out plans for a company which will take over the present concerns and afford a single system.

This action, which is considered the first step toward consolidation, followed a meeting of the directors of the Home Telephone Company. Engineers are engaged in making complete reports on the operating systems of the two utilities.

Whether the rates for service to be charged when the proposed merger of the Pacific and Home companies is completed shall be raised or lowered, or remain as they are, is a question up to the state railroad commission.

The Pacific has applied for a new franchise, but if it absorbs the Home company, it will be able to conduct its business under the Home franchise. The city may file a petition asking that no increase of rates be granted.

The State Railroad Commission will fix the rates based upon the investment, so as to give the company a reasonable return on the investment.

Ohio State Increasing Indiana Holdings

Independent telephone companies of Indiana will be absorbed by the Ohio State Telephone Company. It was stated that negotiations for the purchase of the Indiana interests had practically been closed and that the purchase price of the several companies would run into a large sum, at least exceeding $1,000,000.

It is also reported that the Ohio State Telephone Company will make application soon to put out additional stock to provide funds for the purchase, including six of the leading independent lines of Indiana, which will give the Ohio company through-line connections between Ohio and western and middle western centers.

The authorized stock of the Ohio State Telephone Company, which owns and operates the physical properties and franchises of the old Home Telephone Company in Toledo, consists of $10,000,000 6 per cent cumulative preferred and $7,500,000 common, of which $4,974,000 preferred and $5,206,000 common is outstanding.

Four thousand telephone subscribers in Springfield, Xenia and several villages of Clark and adjoining counties are involved in negotiations for the sale of the Springfield-Xenia Telephone Company to the Ohio State Telephone Company.

Engineers and appraisal men of the Ohio State company completed an inventory a few weeks ago of the entire plant and equipment of the local company and their figures are understood to be for consideration in connection with the sale price quoted by the local concern.

While nothing has been made public as to the valuation placed on the Home company's holdings, it will involve a large amount. The Ohio State company owns and operates the citizens' lines of Columbus and Dayton, which, officials of the local company say, would mean an enlarged field of service for all local subscribers.

The Springfield and Xenia Telephone Company began operations in 1904, and while the majority of subscribers are located in the two cities, the lines extend to practically every village of Clark and Greene counties with the exception of South Charleston.

Beyond a confirmation of the reports that a price had been quoted the Ohio State company and that the complete inventory had been made, no details of the negotiations have been made public.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Sixty Years of Experience

The reputation of a manufacturing company engaged in the making of electrical measuring and scientific instruments comes only after the trade has used and tested its product and has become acquainted with the experience of the individuals who are responsible for the design and efficiency of the product.

The Thompson Levering Company now enters its sixth year in the manufacture of electrical testing apparatus, but the combined experience of the personnel of the company in the testing instrument business is over sixty years in extent.

A. J. Levering, technical engineer of this company, has been in the testing instrument industry since boyhood. For seventeen years he was with a firm which at that time was the premier manufacturer of this type of apparatus in America. Mr. Levering was in charge, for a number of years, of all the high grade precision work, such as standard resistances, standard condensers, testing sets, potentiometers, photometric standards and other instruments of the highest precision. Mr. Levering personally has charge of the shops and besides attending to the design of new apparatus, looks after the resistance department and standardization work, ably assisted by the best workmen that money can secure either in this country or abroad—men skilled in the manufacture of the most delicate instruments.

Daniel J. Corcoran, head of the galvanometer department, has also been in this line all his business life, for eight years having charge of the galvanometer and meter department under Mr. Levering in a previous connection. He has had wide experience with all makes of galvanometers and meters of practically every manufacture and is an acknowledged expert in this branch of the scientific instrument business.

W. J. Thompson, in charge of sales, has twelve years experience in this line and was for some years manager of the electrical department of a large scientific and electrical instrument company.

This combined experience plus the knowledge gained from experimentation for the largest users of testing apparatus in the world goes into the design and manufacture of every one of the Thompson Levering instruments, so it can be truthfully said, not six years old, but sixty.

Stromberg Inter-Comm-Phones for Sears Roebuck

The Sears-Roebuck Company of Chicago, Illinois, one of the largest mail-order houses in the country, recently installed in its stove plant, the E-Z-est Way Stove Works at Kankakee, Illinois, an Inter-Comm-Phone system manufactured by the Stromberg-Carlson Telephone Manufacturing Company of Rochester, New York.

Because of the fact that there is considerable vibration throughout the plant, combination telephones were selected as being the most efficient.

A call system was suggested by the Stromberg-Carlson Company which was adopted by the stove works, and it is stated that the system is giving very satisfactory results. It is arranged as follows: A number of loud ringing bells are placed in various parts of the building and they are operated from the wires in the cable and from one of the push buttons on the key boxes. If the superintendent desires to speak with the shipping clerk and he is not at his desk, the superintendent sounds the shipping clerk's code signal simultaneously on all the bells. The shipping clerk, hearing his call, steps to the nearest telephone and depresses the button corresponding to his own station, thereby getting in touch with the superintendent.

The Stromberg-Carlson Telephone Mnufacturing Company has several forms of advertising helps to assist telephone companies in increasing the volume of their business for inter-communicating telephone systems. A line to the advertising department will bring full details.

Kellogg P. B. X. Propaganda

After all, the test of success of any exchange is the amount of business going over the wires. The busier the lines, without overcrowding, the more surely are subscribers satisfied. Lots of telephone talk helps all around.

How the Kellogg Bulletin Looks.

A man who uses his telephone a good deal pays the bill more cheerfully, too.

A manager may get a goodly number of instruments installed, but if the town is "slow" and the sets are idle, it isn't so easy to get new contracts or keep alive some of the older ones.

So it behooves managers to keep the load up, by every practical means. A campaign urging the use of private branch switchboards is one way to keep up the load. Every such equipment in service not only means added revenue, but actually helps the service by speeding up trunk line calls.

Large offices, factories, warehouses, etc., without this very important business adjunct, not only handicap their own office routine, but the exchange service, by the constant and interminable delays in getting people to the nearest telephone to answer calls.

Convincing arguments are plentiful to prove to merchants and manufacturers the immediate profit to them in this equipment and the value to the telephone company is well brought out in the introductory chapter of a new bulletin on this subject just issued by the Kellogg Switchboard and Supply Company, which reads as follows:

The question which often confronts a telephone company is how to increase its earnings.

Operating and maintenance charges are items which cannot always be lowered to any great degree, if the equipment is right. Therefore, a telephone company must look to by-products to increase its gross earnings. One of these by-products is the private branch exchange. Many companies are now furnishing a limited telephone service to department stores and manufacturing concerns, which, to the customer, is not all that they wish. The breadth and flexibility of such service is limited to extensions and intercommunicating systems; and if the customer is approached and told the advantages of a private branch exchange, he can usually be convinced of its merits.

The service to be given a private branch exchange user with Kellogg Switchboard & Supply Company's type of equipment, properly installed, pleases the subscriber and brings increased earnings to the telephone company.

We are prepared, as manufacturers of high grade telephone equipment, to build apparatus to meet all conditions which may arise with your most exacting customer, and solicit your inquiries for private branch exchanges.

The company is now distributing a new illustrated bulletin on this equipment as shown in accompanying photograph. It will send copies to interested telephone men.

New Double Contact Push Button

A new type of push button has recently been placed upon the market by the Connecticut Telephone & Electric Company of Meriden, Conn. This button is fitted with long self-cleaning contact springs which have a double wipe. This is the only push button upon the market with a double rubbing contact. Contacts are protected by a

The Connecticut Push.

heavy metal guard, and lugs on the side of binding post screws keeps the wire connections in position—no soldering is necessary.

The push button has a large oval center which has a solid stop. The entire button is solidly built and is practically indestructible. This button is arranged to be mounted singly or in groups and designed to fit a 5/8-inch hole and can be furnished with black, white or pearl center as desired.

The E. I. du Pont de Nemours Company of Wilmington, Del., has just had printed a "Clay Blasting Booklet." As it is the first booklet ever issued on this subject it contains valuable and interesting information. Some of the phases covered are "Digging Clay," "Stripping," "Blasting Down Shale," "Digging Plastic Clays," "Mining Flint Clays," "Draining Clay Pits," as well as full information on the use of explosives. The booklet will be sent to any address upon request.

Protected Guy Wires

The Bierce guy wire protector has been designed to take the place of various makeshift arrangements that have been used in the past for protecting the public from the danger of running into exposed guy wires. There has never been any standard device manufactured for this purpose, various companies using second-hand pipe, wooden boxes, posts stuck in the ground, etc., as the fancy strikes them.

Devices of this nature, besides being unattractive, are more expensive than the Bierce guy wire protector, and have other disadvantages which expose their use to severe criticism. The wooden boxes are frequently broken by coming into contact with wagon hubs, and when once broken rapidly deteriorate, while the iron pipes which are in common use, and which must necessarily rest on the ground for support, as there are no means of clamping them to the guy wire, have a tendency to hold rain water, and cause it to rust through the anchor rod near the ground line in a very short time.

The Bierce protector is made of a heavy gage steel formed to a half circle. The protectors are seven feet long, weigh twelve pounds, and are provided with a clamping device eighteen inches from each end for attaching to the guy wire at any point desired.

One clamping device on the protector is provided with a bolt one inch longer than the other. This enables the longer clamp to be clamped over the anchor rod, if desired, while the other clamp is attached to the guy wire, as usual.

These protectors are neat in appearance, and present sufficient surface to be plainly visible from all sides. Their length, seven feet, is sufficient so that the top of the protector will be above the level of a man's head even when the bottom of the protector is near the ground level.

In addition, the protectors are very easily installed, are practically everlasting and cost less when installed than any other device used for the same purpose. They are finished in light gray color.

Oldest Telephone Operators in the World

At the Linkville exchange, just outside of Kansas City, Harry Moore, aged 72 years, and his wife, Anna Moore, aged 66, plug in on the switchboard to answer calls and give connections. They give day and night service and love the work. Though Mr. and Mrs. Moore are well along in years, the subscribers at the Linkville exchange never have to complain about the service. It is prompt and cheerful and efficient.

The board was made in 1905 by the Missouri and Kansas Telephone Company of miscellaneous telephone apparatus manufactured by the Western Electric Company.

These operators take a great pride in their work. They know every man, woman and child in their community, and they know every subscriber's number. One of them is always at home. One of them is always at the switchboard. They have grown old gracefully, and while their voices have long ago lost the soft and happy tones of youth, yet they always speak with a cheerful kindness that wins and holds the good will of their subscribers.

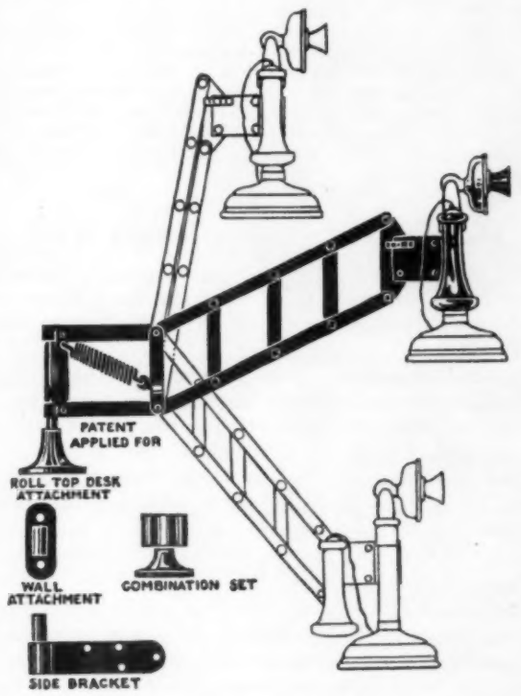
The story of these oldest operators in the world, who never receive a complaint on the service, might be

read with profit by the youngest operators in the world. Mrs. Moore sits at the board with her spectacles and her gray hair done up tight on her head, all the infirmities of old age conquered by the spirit, and her toil-worn hands move alertly to plug in on the calls. The three score years and twelve sit lightly, too, upon Mr. Moore. His wife is the chief operator, of course, but he is her worthy and faithful assistant. Their work and their record is an inspiration.

The Cruse Telephone Bracket

The Cruse "Perfect" telephone bracket, sold by the Kellogg Switchboard and Supply Company, is fast becoming one of the most popular on the market.

It has many advantages and certainly fills a long felt want. The bracket can be attached to any make of telephone and enables the user to move it up or down or sidewise. It can be used on either flat or roll top desk and where two telephones are needed a twin base



The Cruse "Perfect" Bracket.

can be furnished that holds both brackets in a most satisfactory manner and allows them to be moved in any direction. They are furnished in black, oxidized or nickel-plated finish.

A folder supplied by the Kellogg Switchboard and Supply Company to its customers for distribution among subscribers, tells in a brief sentence the big advantage of using the Cruse bracket: "Out of your way, but at your finger tips."

Upon request, these illustrated folders will be furnished by the Kellogg Company.

Bulletin No. 202-1 of the Standard Underground Cable Company, issued in March, 1916, describes the uses and characteristics of Colonial Copper-Clad (C. C. C.) wire. Tables are published comparing properties and costs with equivalent copper wire, as well as interesting strength curves. Telephone men will do well to read it.

Running Elevators by Telephone

To facilitate the operation of elevators in office buildings, an elevator telephone system has recently been designed by the Western Electric Company. In all of the buildings in which it has been installed it has proved remarkably successful, especially in the Woolworth and new municipal buildings in New York City, where the elevator traffic is exceptionally heavy. In each of these buildings during the morning rush period nearly two thousand people are carried to their respective offices within a quarter of an hour.

The elevator service central system in these buildings is a combination of the Western Electric loud-speaking telephone and the Elevator Supply and Repair Company of New York elevator lamp signal system. The passenger, upon entering an elevator, notices on one side of the car a wall telephone set and directly above it a loud-speaking telephone receiver. This apparatus is used for providing means of instant communication between the elevator dispatcher and the car operators.

The dispatcher wears a telephone head set, consisting of a head receiver and chest transmitter. His small telephone switchboard is electrically connected to all the elevator cars. Mounted in the switchboard there are the usual cords and plugs, jacks and keys for the dispatcher's signaling and for making connections with the car telephones. Placed directly in front of the dispatcher is a bank of lamps, corresponding to the number of elevators under his supervision and the total number of floors having elevator service. The lamps for each elevator are mounted in vertical rows, two rows per car—one to indicate the upward movement, and the other the downward movement. As an elevator arrives at he different floors the corresponding lamp in front of the dispatcher's board is illuminated.

The means for instant communication is the special feature which makes possible the satisfactory dispatching of the elevators. When it is necessary for the dispatcher to give orders or instructions to the car operator it is essential that it be done with the least possible delay. To talk to the operator the dispatcher "plugs in" on that line and uses the loud-speaking receiver. This loud-speaking receiver is a very sensitive telephone receiver, being equippd with a horn so designed as to distribute the vocal sounds under the best possible conditions. It is not necessary for the operator to stop his car while receiving these instructions, and should it be necessary to immediately reply to the dispatcher, the operator can talk directly into the loud-speaking receiver, using it as a transmitter. If the operator desires to call and talk to the dispatcher, he needs only to take the receiver off the hook of the standard telephone, so signaling the dispatcher, who "plugs in" on the operator's line and carries on a conversation.

By means of the lamp signaling system, combined with the loud-speaking telephone apparatus in the dispatching of elevators in our modern buildings, the most satisfactory elevator service is obtained. The dispatcher can observe every move and stop of each elevator. When irregularities or delays occur, the operator can signal—and if necessary talk to the dispatcher, and thus facilitate the straightening out of the kinks in the elevator service. Most important of all, however, is the fact that the dispatcher can be in instant communication with the operator in each elevator, for by means of the loud-speaking telephone instructions can be conveyed without stopping the even swing of traffic.

Devises a Time Limit Register

H. R. Pope, manager of the Petroleum Telephone Company at Franklin thinks he has found a device that will automatically register the time limit on five-minute telephone calls. He has filed an application for a patent for such an indicator.

When the local telephone company announced recently that calls between Oil City and Franklin would be limited to five minutes and subject to charge for overtime, the operators were immediately facing difficulties of keeping tab on the calls. The only way was to record with a pencil the hour and minute the call was sent in. With hundreds of calls flashing over the wires, this complicated things to such an extent that Pope set about finding a remedy. He wanted a mechanical device that would do the work automatically, accurately and in a way that the operator could see at a glance when the time limit had expired. He tried to find something that would answer this description, and when he found no one else had invented such a contrivance he got on the job himself. Two score or more devices were planned until he hit upon the right one.

The indicator he has invented records a connection made with Oil City and flashes a signal when the five minutes is up. As a matter of fact, the device is adjusted to flash a signal in six minutes and a half, a minute and a half being allowed for the person first to get Oil City and then the party he wishes to talk with, though the average time for connection is much less than that. Indicators have been installed in the office at Franklin and others will be installed at Oil City. Several other companies having time-limit lines are preparing to do likewise.

Buried Cables

Editors Telephone Engineer:—I wish to state in reply to the article in your March issue in regard to the burying of cable underground that I have known of the practice for at least seven years. My attention was called to it at first by one of my linemen who was making a visit to the state of Washington. He said that they were laying it there without any protection at all.

Three years ago when we built a new office building at Mazeppa, Minn., we laid the cable in the ground. We first dug a trench about two feet deep and laid in the cable, covered same up with tar paper, and put in a board over this and laid about four inches of concrete over this only as a matter of protection. Anyone digging in the ditch would come to this and then perhaps might save the cable unless he was too strong.

Will say that Dr. Gates of Kenyon, now running for lieutenant governor of this state, laid several thousand feet about two years ago in his city. I do not know of anyone having any trouble in regard to this method of laying cable and I also would like to hear from any that have.—Zumbrota (Minn.) Telephone Co., F. C. Marvin, sec. and treas.

General Insulate Company Expanding

The General Insulate Company, 1008-20 Atlantic avenue, Brooklyn, N. Y., the well-known moulders of "Insulate" and "Hi-Heet" moulding compound, has established such a demand for its products that it has just broken ground for an addition to its present building in Brooklyn and has contracted for additional equipment which will increase its plant and will enable it to more than double its present capacity. Some departments of General Insulate Company have been working nights and holidays for some time past; none of its output, the company's officials state, is "war business," but for good old Uncle Sam's own children's demands.

Coin Boxes Favorites in Los Angeles

President Lane of the Board of Public Utilities forwarded to the Los Angeles city council a detailed report showing that a majority of telephone subscribers questioned, favor the nickel-in-the-slot phone. President Lane asserts that about 60 per cent of the money received by the companies from this source of revenue comes from tourists and that the service is more economical and beneficial to the subscribers than any other system.

In his report President Lane says in part:

During a period of three months ending last December tabulation of each of 50 sets of telephones indicate that the average net revenue per month to the Pacific Telephone and Telegraph Company was $9.48, and the average net revenue per month to the Home Telephone and Telegraph Company was $10.00. The average net revenue to the Pacific subscriber was $2.72, and that to the subscriber of the Home was $1.62.

The average monthly refund over the entire system to the subscriber of the Home Company was $1.80 per telephone, while the average monthly refund to the subscriber of the Pacific Company was $1.28.

The Home Company has no record of the slugs found in the boxes, but the Pacific Company has kept a close check on these slugs, and of the 174 nickel-in-the-slot telephones investigated by this board we find that some telephones run as high as 295 slugs per month, while some run as low as one slug per month. The average for the Pacific in these 174 telephones was 17 slugs per telephone per month.—Los Angeles, Cal.

Flame Proof Enameled Jumper Wire

The Kellogg Switchboard and Supply Company reports many orders for its new standard flame-proof 2-conductor jumper wire, of No. 22 gauge tinned copper.

Enamel insulated wire is used in this product, which makes it particularly desirable in localities subjected to extreme moisture, or for plants operating on high voltage. It is easy to skin, has small overall diameter and has no inflammable rubber insulation, and is, in fact, a wire of very superior flame-proof qualities.

Telephone Apparatus, No. 20783.—An American consular officer in Chile reports that a recently organized telephone company in his district desires to communicate with American manufacturers of materials for telephone installations, especially automatic instruments. Correspondence may be in English. It is estimated that about 10,000 automatic instruments will be required when the service is completed and that the lines will have a length of about 1,550 miles. Refer to File No. 20783, U. S. Bureau of Commerce.

Telephone Equipment No. 20738. An American consular officer in Venezuela reports that a man in his district desires to receive catalogues and price lists from American manufacturers of equipment for a small telephone system. Correspondence and literature should be in Spanish if possible. Refer to File No. 20738, U. S. Bureau of Commerce.

Pay Telephones, etc., No. 20753.—An American consular officer in Peru reports that a man in his district desires to be placed in touch with American manufacturers of slot telephones for the Peruvian 5 and 10 centavo piece. Refer to File No. 20753, U. S. Bureau of Commerce.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

Gilbert Gislasen has just been made general superintendent of the Stromberg-Carlson Telephone Manufacturing Company at Rochester, N. Y. He succeeds Harry E. Krause to that position. Mr. Gislasen was formerly assistant superintendent of the same company. Prior to that he was manager of the telephone cost department at the Western Electric Company's Hawthorne works for four years, going there from the American Electric Company. At that place he also had charge of the cost department and installed a highly efficient system of cost records. Mr. Gislasen hails from Washington Island, a romantic spot in the north end of Lake Michigan, where he usually spends his vacations. His record in the telephone manufacturing field has been continuously upward, and we are confident that his limit is still considerably higher. Knowing him as intimately as we do, we expect further surprises from him in the next few years.

Charles A. Vincent, formerly manager of the Chippewa Falls exchange of the Wisconsin Telephone Company, has been elected manager of the St. Croix Telephone Company of New Richmond. Mr. Vincent is the successor of P. C. Harmon, who is now connected with the Wells Electric Construction Company of New Richmond.

George H. Reynolds, who has been resident manager of the Bell Telephone Company at Corning, New York, has been appointed manager of the new commercial district at Corning which was recently established.

C. L. Sluyter has been promoted from district traffic manager with headquarters at Hastings, to traffic engineer at Lincoln,

Dan Smith of Rock Island has been appointed manager of the Moline, Illinois, exchange of the Central Union Telephone Company to succeed Carlo Montgomery, who has been transferred to Pontiac and Dwight as manager of the exchanges there.

Fred M. Ketchum, for the past six years in the auditing department of the Cincinnati and Suburban Bell Telephone Company at Cincinnati, Ohio, has been appointed traveling auditor for the American Telephone & Telegraph Company, with headquarters at New York.

James William Gillespie died March 29 at Harrisburg, Pa., at the age of seventy years. Mr. Gillespie was an old timer in the telephone business, having specialized on toll and long distance matters, taking an active part in the reorganization of the toll line system of the Central New York Telephone Company, at Syracuse, where he was superintendent. After the merger of the Central New York Telephone Company with the New York Telephone Company, Mr. Gillespie remained in the service of the New York company until 1910, when he resigned to become telephone expert for the railroad commission of Pennsylvania, which position he held at the time of his death. He was a member of the Engineers Society of Pennsylvania and the Telephone Pioneers of America.

Herbert Pope, for many years associated with Herrick, Allen & Martin of the Chicago Bar, has become a member of the firm Cassoday, Butler, Lamb & Foster, with offices in the Monadnock building, Chicago, taking effect April 1.

Samuel G. McMeen, president of the Columbus Railway and Light Company and the Ohio State Telephone Company, was recently elected president and secretary of the Ohio division of the government's naval consulting board.

A reception was tendered to Miss Kate Eagan celebrating her twentieth year in the service of the Missouri & Kansas Telephone Company, at Kansas City.

John L. Boroughs, district plant chief of the Southern Bell Telephone Company, died at Birmingham, Alabama, from injuries he received in an automobile accident.

Theodore N. Vail, president of the New York Telephone Company, has returned after spending about five weeks at Guatemala.

L. H. Keller, manager of the Chicago district of the Moloney Electric Company, has been transferred to St. Louis, Missouri, to an executive position in the general offices of this company.

The Industrial Club of Chicago recently elected W. R. Abbott, general manager of the Chicago Telephone Company, as president.

Reeder Miller, chief clerk in the Allentown commercial office of the Bell Telephone Company of Pennsylvania, has been appointed local manager of the company at Honesdale.

J. E. Gilbert has resigned as manager of the exchange at Bantry, North Dakota. Mr. Gilbert is succeeded by William Dawson.

The state public utilities commission of Ohio recently appointed from a civil service list C. B. Forrest, Middleport, and C. W. Lutz, Circleville, as assistant telephone experts to fill the vacancies created by the promotion of Thomas E. Green to chief expert and the resignation of A. S. Hillhouse, Cleveland.

Jesse G. Bixby has been appointed night toll testman of the New England Telephone and Telegraph Company, Boston, Mass., to succeed the late John O. Roorbach.

Miss Nina Wernette, who has been the manager of the Pioneer Telephone Company's office at Walters, Okla., for more than five years, has resigned. Miss Eva Lantz has been named as her successor.

K. L. Butler, manager at Belzoni, Mississippi, for the Cumberland Telephone Company, has been succeeded by Hugh Warren of Jonestown.

NEWS FROM THE FIELD

ARIZONA.

Work on the new toll line of the Mountain States Telephone Company to Nogales is awaiting the arrival of the poles, according to district manager R. L. Burgess. The company has forty tons of copper wire stored in Tucson ready to be strung, and as soon as poles are secured work will be rushed. The installation of equipment in the new building of the company on East Pennington street will be started within a short time, but the plant will not be ready for occupancy until August 1.

ARKANSAS.

The Missouri and Kansas Telephone Company is making extensive improvements in its line in Southwest City.

The Arkansas-Missouri Telephone Company will rebuild its line between Cotter and Batesville. The line will be rerouted over part of the distance, so as to include Ruddells, Sylamore and Mountain View.

CALIFORNIA.

The Pacific Telephone and Telegraph Company in Livermore has cut over its office from K street to Lizzie street.

Plans for a telephone line direct from Tulare to the Woodville section were discussed at a meeting of the Woodville Board of Trade, which was attended by a delegation from the Tulare Board of Trade. It is now necessary to telephone long distance through Porterville to reach Tulare, and better connections are desired. J. W. La Marsna, J. B. Monroe and O. B. Devericks were appointed a committee to canvass the territory and secure a list of those desiring service.

Work will be started immediately by the Pacific Telephone and Telegraph Company on the shortening and re-routing of the Sacramento-Marysville toll line. The new alterations will cost approximately $5,550. The work is expected to be completed in about 180 days.

Plans and estimates of cost of the new building soon to be erected for the Gilroy Telephone Company in Monterey

street between Fourth and Fifth streets, Gilroy, are being prepared. It will be a two-story building, 20x80 feet in dimensions, and with all necessary modern improvements.

Improved telephone service is to be initiated in North Sacramento by the Pacific Telephone and Telegraph Company in the near future.

CANADA.

The Martintown Rural Telephone Company, Martintown, Ont., has been granted a charter.

The B. C. Telephone Company will establish a central energy system in Nelson in the future.

A charter has been obtained by the Independent Telephone Association, Limited, Mono Mills, Ontario.

At the annual meeting of the Bruce Municipal Telephone System, Post Elgin, Ont., D. McNaughton, A. McLean, and J. J. Hunter were re-elected commissioners. Mr. McNaughton was also appointed president for the year. The question of connecting up with the Bell Telephone System was discussed, and it was decided to close an agreement with this company if their terms were not too severe.

COLORADO.

Work is progressing on the new addition to the Mountain States Telephone and Telegraph Company's building in Pueblo, which will be finished in time for occupancy by May 1.

ILLINOIS.

The Chicago Telephone Company will place all wires under ground in Batavia from Wilson street north to Geneva.

Work has been started on the new South Chicago Telephone exchange which is to be located at 2652-2664 East Eighty-ninth street.

Alexander County Telephone Company, Olive Branch; capital, $5,000; incorporators, Clinton E. Miller, W. W. Wilbourn, Jesse Miller.

Contracts for the installation of a switchboard and telephone system in the proposed hotel Dudley in Galesburg have been closed by manager Kelly of the Bell Telephone Company and manager Clyde Bandy of the new hotel. The contract calls for the installation of 106 telephones of standard type, capable of use for long distance service.

William McFryer of Wheaton, district manager for the Chicago Telephone Company, states that the plans for the building to be erected at Geneva for use as a central telephone station for the cities of Geneva, St. Charles and Batavia, are expected from the architect in a short time.

The Chicago Telephone Company will establish a large storage warehouse on Marquette street, North Chicago, which will serve the district from the state line to Highland Park.

INDIANA.

Jeffersonville Home Telephone Company, Jeffersonville, has dissolved.

The Ashley telephone exchange, operated by the Northern Indiana and Southern Michigan Telephone Company, are contemplating to build an addition to the exchange and install a new switchboard.

At a meeting of the Farmers' Co-operative Telephone Association, at which there were a large number present, they voted to increase the captal stock with which to develop their telephone business. This company, for a number of years has maintained a small exchange in Aurora and also one at Wilmington, and under the new arrangement they would eliminate the Wilmington exchange, putting in a much larger and better exchange at Aurora.

IOWA.

Work on the new telephone building which will be erected at the corner of Fifth and Superior streets, Mason City, by the Western Electric Company has been started.

The directors of the Lanesboro Mutual Central Telephone Company met with Mayor Hinkley and elected the following officers: J. D. Hingley, president; Frank McCoy, secretary-treasurer and manager. The directors appointed a building committee consisting of Hinkley, McCoy and Toyne to make plans and specifications for a hollow brick tile building to be pebble dashed with cement and gravel. The building will be one story with basement and erected on their lot adjoining the bank on the west.

Braddyville Central Telephone Company, of Braddyville. Capital $10,000. Harry Douthit, president; Roy McCarkle, secretary.

At a meeting of the officers of the Independent Mutual Telephone Company, Shenandoah, it was decided to disburse to the preferred stockholders the principal of their original investment and checks for this purpose were drawn at once. The principal of the common stock will be disbursed a little later and the affairs closed permanently. There will be a small dividend paid to the preferred stockholders.

The Independent Telephone Company of Shenandoah has been sold to the Bell Telephone Company after negotiations of several months. E. A. Read, treasurer of the Independent Company, received a check from the Bell Company for $75,000, the new owners taking immediate possession of their property.

The Martin Telephone Company's plant at Webster City has been sold to the Farmers and Merchants Telephone Company of Hawarden. The new exchange will be managed from Hawarden temporarily by B. H. Van Vliet.

The central energy system has been installed at the Oelwein exchange of the Corn Belt Telephone Company.

The revenue accounting department of the Iowa Telephone Company has been moved from Des Moines to Omaha.

The Hurmence Telephone Company, Sumner. Capital $150,000. W. E. Hurmence, president; Charles R. Hurmence, secretary.

The Northern Telephone Company, which operates toll lines and exchanges at Alta, Storm Lake, Newell, Rembrandt, Pocahontas, Gilmore City, Verina and Fonda, has been sold to W. J. Brownell, of Hawarden. George M. Ross, of Storm Lake, will remain with the new company as manager of the property.

KANSAS.

The new building of the Missouri and Kansas Telephone Company at Wichita will be of reinforced concrete, with brick veneer, four stories high with basement the full size of the structure. It will be 60x140 feet. The site for the building is at the southeast corner of First street and Lawrence avenue, just east of the Butts building. It will be the finest building in Kansas devoted exclusively to the telephone business. One of the terms of the contract is that the building must be completed by October 30.

The new telephone building in Sylvan is being rushes to completion.

William Mangels of Plevna has purchased the telephone system at Rolla.

Work has been started on the rebuilding of the south Gray telephone line, which when completed will make the line practically a new one.

The telephone line along the Anthony & Northern has been completed as far as Fellsburg.

The Arkansas Valley Telephone Company has taken possession of the entire telephone plant in Garden City. The new company will erect a new and modern exchange building and install the central energy system in the future.

The Bell Telephone Company has bought a site at Lyons for a new telephone building, soon to be erected. The exchange building probably will be 50x120 feet, and a two-story brick.

When Kansas was swept by a sleet and snow storm recently telephone lines were badly damaged. Near Marysville only one pole in a section four miles long was left standing.

New signals have been installed in the telephone office in Salina increasing the number to 4,000.

KENTUCKY.

The Bastine Telephone Company of Lancaster has raised the rates to $1.50 per month and $2.00 per month for business phones.

Ohio County Mutual Telephone Company, Hartford, increased capital from $10,000 to $20,000.

Long distance connections have been completed by the Cumberland Telephone and Telegraph Company, making direct connection with Lexington, Louisville and important points in the state.

LOUISIANA.

The telephone system in Crowley will be improved by the Cumberland Telephone & Telegraph Company. They will spend about $12,000 to $15,000.

MICHIGAN.

The United Telephone Company intends starting a canvass of the territory around Muskegon for a series of rural lines within the next few weeks, it being the object of the company to install about eight party lines branching out from the city in all directions if the necessary subscribers can be signed up.

Stockholders of the Michigan State Telephone Company held their annual meeting in the company's office, Detroit, April 11. The report of the directors was approved, and directors were elected for the ensuing year as follows: Frank W. Blair, Emory W. Clark, Henry Russel, Dudley E. Waters, William Judson, U. N. Bethell, N. C. Kingsbury, Theodore N. Vail, Alonzo Burt, H. F. Hill, B. E. Sunny. The meeting of the directors for organization and election of officers will take place early in June.

Beginning June 1 the Michigan State Telephone Company will install both underground and aerial cables in Kalamazoo.

The directors of the Citizens Telephone Company, Grand Rapids, declared the usual quarterly dividend of 1¼ per cent,

payable April 20. The matter of filling the vacancy caused by the death of president Charles F. Young was not acted upon. Vice-president Robert D. Graham was urged to accept the presidency but declined.

MINNESOTA.

The Mission Lake Rural Telephone Company was recently organized at Merrifield to serve territory tributary to Brainerd, including farmers around Mission Lake, Lake Edwards, Merrifield and other points. The company will get Brainerd exchange service, making a long distance contract with the Northwestern Telephone Exchange Company of Brainerd.

A new telephone line will be built from Spooner along the Rainy river to the Wheeler store at its mouth.

Arrangement has been made in Ellendale that telephone service will be available at five o'clock in the morning, beginning May 1 and ending October 1.

The farmers of Eden have arranged to form the Eden Farmers' Telephone Company and will build lines to accommodate all who join. A committee was appointed to secure right of way privileges on the highways and to solicit stock.

March 27, the stockholders of the Nevis Telephone Company, Nevis, held their annual meeting and report a very successful year. The officers for the coming year are as follows: Swan Rodine, president; Abe Lewis, vice-president; J. H. Halvorson, secretary and treasurer; J. H. Nixon, Ed Erickson and Sivert Olson, trustees.

MISSOURI.

Eight thousand copies of the April issue of the Missouri and Kansas Telephone Company's directory has been issued.

Representatives of the various mutual telephone companies in Brown, Nemaha and Doniphan counties formed a mutual telephone association at Hiawatha, April 7, for the safeguarding of the best interests of mutual telephone companies in this section of the state. Among the companies represented were those at Bendena, Denton, Highland, Leona, Huron, Willis, Everest, Fairview, Powhattan, Hamlin, Reserve and Hiawatha.

MONTANA.

Articles of incorporation of the Smith River Telephone Company have been filed for the purpose of constructing a telephone line from Great Falls to and through Ulm and into and through the towns and country in the southern part of Cascade county through the Smith river valley. The capital is fixed at $10,000 in shares of a par value of $100 each. The directors are W. H. Simpson, B. P. Carr and I. K. Huntsberges, all of Great Falls, together with A. J. Bruneau and H. B. Ellis are shown to be subscribers for one share of stock each.

Judge Lynch has signed an order for the dissolution of the Interstate Consolidated Telephone Company at Anaconda. The dissolution had been ordered by a vote of more than two-thirds of the stockholders, and all claims against the company had been satisfied.

The Mountain States Telephone Company will erect a new building at 305 First street, west, Roundup.

NEBRASKA.

At the stockholders meeting of the Platte County Independent Telephone Company, it was decided to expend $15,000 in improvements of the lines and putting wire underground in Columbus.

The petition that the telephone franchise in Utica be cancelled was up before the village board at the regular meeting held April 3, but the matter was not settled. It will be up for discussion at the regular meeting in May.

General Manager Hurtz of the Lincoln Telephone & Telegraph Company at Lincoln, stated that the sleet storm that swept over the country the later part of March, was the worst in the history of the company. Out of 126 toll lines leading out of Lincoln only two were in working order. The lines are being put in order as rapidly as possible although it will take most of the spring and summer to put the system into its normal condition.

The officers of the Moorefield Farm and Ranch Telephone Company, have closed a deal with the Curtis Telephone Company, selling to them their entire equipment, established and operated, within the corporate limits and east as far as Wm. Seide's residence.

The Nebraska Telephone Company is installing a new private branch exchange at the Alliance hotel, Alliance.

NEW JERSEY.

Haddonfield Rural Telephone Company, Springdale, telephone operations, $2,000; Edward J. Dougherty, Edwin Ballinger, Charles D. Ballinger, Marlton.

NEW YORK.

The monthly meeting of the Telephone Society of New York held at Federation hall, Elmira, was largely attended by hello girls, heads of departments, representatives of the clerical forces, engineers and traffic managers, all employes of the New York Telephone Company in this and other districts. A very interesting program was rendered after which the guests danced. This was the first time Elmira was honored with such a meeting.

The Bell Telephone Company has created a new commercial district, to be known as the Corning district, and comprising the county of Steuben, N. Y., and a few sections of Tioga county, Pa. George H. Reynolds has been made manager of the district.

The graduating classes of public schools in Long Island City have recently enjoyed the courtesy of the New York Telephone Company in specially conducted tours through the Astoria Central office building.

The New York Telephone Company will install a private branch exchange for the Boston Store company in Glenn Falls.

NORTH DAKOTA.

At a meeting of the farmers held at Ambrose, it was decided to re-establish the Divide County Farmers' Telephone Company, and a committee was appointed to sell stock and ascertain how many farmers would subscribe.

The Brocket Farmers' Telephone Company, at its regular meeting, voted to increase the capital stock from $15,000 to $30,000.

The North Dakota Independent Telephone Association has selected Minot for its next convention.

A new telephone company has been organized to be known as the North Marion Farmers' Telephone Company. The lines now running through Greenland township, owned by the Bell Telephone Company, have been purchased by them.

The Farmers' Mutual Telephone Company held its annual meeting in Souris. F. G. Bartz of Kramer and N. Magnuson of Souris were re-elected directors for three years, and J. L. Gorder of Carbury was elected in place of L. J. Glomseth. Other directors are: L. J. Mork, Souris; Martin Rothe, Carbury; Ole M. Ramstad and O. R. Finstad, Landa; E. J. Evenson, Kramer, and A. P. Anderson, Newburg. The board organized by electing J. L. Gorder, president; L. J. Mork, vice president, and N. Magnuson, secretary-treasurer.

NORTH DAKOTA.

Telephone exchanges at Harvey, Anamoose, Balfour, Dogden and Kief have been sold by the Great Western company to the Northern company of Minot. Now it is understood the Northwestern has a deal on to purchase them.

A shipment of telephone poles have been unloaded at Rock Lake, preparatory to the extension of the telephone line some miles north of that plac.

OHIO.

Twenty-four hundred people attended the opening of the Ohio State Telephone automatic system held at their new quarters in Alliance, March 23. Roses were distributed to the lady visitors as souvenirs.

The Putnam County Telephone Company, Ottawa, $1,000, A. J. Mellen.

The Cleveland Telephone Company, Columbus, was authorized by the secretary of state to increase its capital stock from $4,000,000 to $6,000,000.

The directors of the Telephone Improvement Company at a meeting recently held in Cleveland, elected Robert Stevens, president and director to succeed his father, F. C. Stevens. Garrison Babcock of Chicago, who resigned, was succeeded by G. M. Dickerson.

The Amherst Home Telephone Company has issued a new directory.

The Ohio State Telephone Company will spend $15,000 on improvements in Buckeye Lake, the work to begin at once.

The Sandusky Home Telephone Company, Sandusky, $250,000, Homer Metzgar.

The Ohio State Telephone Company is extensively improving its exchange at Canton. Six additional positions will be filled at the switchboard which will give room for 600 additional lines. The front of the office will be remodeled and the old store front removed. The main office will be remodeled and enlarged. Several improvements will be made for the convenience of the operators including an enlargement of the rest room and the addition of a kitchen for the convenience of the operators who eat their lunches at the exchange.

OKLAHOMA.

The Pioneer Telephone Company is preparing to install the common battery system at the Pauls Valley exchange and contemplate having it in operation by October 1.

The Mendon and Waldron Telephone Company, Alfalfa county, near Amorita, incorporators F. M. Potter, A. I. Swem, T. H. Bodkins, Amorita. Capital stock $360.

The Crawford Telephone Company, Crawford—Incorporators: William Allen, Sam Branham, Crawford; A. M. Patterson, Roll.

Vonton Telephone Company, Vonton—Incorporators: J. L. Steadman, J. H. Ludwick, H. C. Groves. Capital stock, $500.

Thirty telephone operators held a conference in the Hotel Severs, Muskogee, April 12, with H. L. Baldwin, district traffic chief, and C. B. Crabb, district traffic superintendent, of Oklahoma City. The conference was attended by the chief operators from all towns embracing the Muskogee district. The purpose of the conference was its discussion of their work, with a view of bettering the service. A talk, on efficiency, was made by Mr. Baldwin, assisted by Mr. Crabb.

PENNSYLVANIA.

Beginning April 1, subscribers of the Bethel and Mt. Aetna Telephone Company will have their telephone rates increased to $15 and $20, instead of $12 and $18, the previous rental rates. The advance was made necessary by the increased cost of materials.

Cameron L. Baer, general manager of the Cumberland Valley Telephone Company of Pa., has announced that arrangements have been completed for the installation of the automatic telephone system in its Harrisburg and Steelton districts at a cost of thousands of dollars. The contract for the installation of the new system has been signed with the Automatic Electric Company of Chicago.

The new telephone exchange installed by the Bell Telephone Company in the court house, Norristown, has been placed in operation.

Officers were elected as follows by the Western Pennsylvania Telephone Association in annual convention at Lancaster, April 14: President, E. M. Prisk, Hazelton; vice-presidents, G. R. Rudy, York; C. H. Mounce, Lansford; secretary-treasurer, O. K. Kines, Harrisburg. Executive committee—E. M. Prisk, Hazleton; C. A. Carl, Harrisburg; J. F. Stockwell, Philadelphia; H. M. Tracy, Cumberland; H. O. Oberdorf, Columbia. The next meeting will be in early Fall at either Philadelphia or Atlantic City.

PENNSYLVANIA.

The Bell Telephone Company is making preparations to extend its line in Angelica, but permit has not been granted as the line runs through private land and the owners have not given their consent.

The Pennsylvania Railroad is dispatching by telephone from Kane to Erie, the new system being recently inaugurated.

SOUTH CAROLINA.

A meeting was held at Fort Shoals to complete plans to have a telephone exchange at this place.

SOUTH DAKOTA.

The Loomis Telephone Company, Loomis. Capital, $10,000. Incorporators, J. S. Bonham, H. D. Lewis, J. W. Wells, and others.

The Britton Telephone Company, Blunt, capital $1,000. Incorporators, H. E. Carey, J. C. Higgins, P. D. Foote, E. G. Carey, J. H. Hoefer.

Two new telephone lines will be run out of Java this spring. One will be built southwest of town and will connect with the Selby and Spring Lake line, while the other will be constructed northeast of town to connect with Eureka.

Articles of incorporation have been filed for the Pass Creek Telephone Company, of Bennet County; $5,000; Ed Hall, Alexander Livermont, Ed Amiotte and others.

A mass meeting of townspeople and ranchers from the surrounding region was held in Rochford for the purpose of arranging for the construction of several rural telephone lines to communities in this territory which now are not connected with Rochford by telephone.

The Golden West Telephone Company, Quinn, capital $10,000. Incorporators, Nick Caspars, E. H. Helma, Ira Bullis, W. L. Brownson, E. S. Johnston.

TENNESSEE.

All telegraph, telephone, lights and other poles owned by public utility corporations in Knoxville must be painted and numbered, and a map showing the location and owner of the same, filed with the commissioner of street and public improvements, according to the ordinance recently passed.

TEXAS.

The Brenham exchange of the Southwestern Telephone & Telegraph Company is being remodeled. The offices will be rearranged and new furniture installed.

Certificate of dissolution has been filed by the United Telephone Company of Waco.

WASHINGTON.

The Farmers' Independent Telephone Association, of Salem, on Toledo and Salmon creeks, has transferred its franchises to the Salmon Creek Telephone Association. The deed also conveys an undivided interest in the Winlock, Chehalis and Ethel lines.

At the annual meeting of the stockholders of the Richland Telephone Company, Richland, the following officers were elected for the ensuing year: Dr. C. D. Hopper, Otto Haeiusen, B. S. Wadsworth, John Erickson and H. E. Compton.

WEST VIRGINIA.

Members of the Reliance Hose Company, Warwood, have completed negotiations with the Bell Telephone Company on installing a telephone fire alarm.

WISCONSIN.

Sale of 200 miles of telephone lines in La Crosse county to a co-operative association of farmers has been made. The property includes the exchanges at Holmes, Bangor and Mindoro and all connecting lines heretofore owned by the Bangor Telephone Company.

The Wisconsin Telephone Company directors, at their quarterly meeting March 23, re-elected Bernard E. Sunny president; Alonzo Burt, vice-president and treasurer; H. F. Hill, second vice-president; W. I. Mizner, secretary, and H. O. Seymour, general manager.

Colburn Mutual Telephone Company, Colburn, capital, $1,050; incorporators, T. M. Nelson, R. C. Joyce, G. H. Attlesby.

At a meeting of the officers and stockholders of the Manitowoc and Western Telephone Company held at Cato, Wm. Link was elected manager; Geo. Wittman, president; W. Killen, treasurer, and F. Meisnert, secretary.

Valentine S. Keppel was elected temporary manager of the new Bangor Telephone Company, at a meeting at Bangor, when the concern was taken over by the new owners, who have converted it into a co-operative concern. Directors elected were: Ira Richardson, Bangor; V. S. Keppel, Holmen; A. H. Bradburn, Holmen; John Wolf, Ashland; Henry Gullickson, Mindoro; and Orrin Fletcher, Bangor. The sum of $40,000 was paid for the company's equipment.

A new telephone line from Portage to Westfield is contemplated for construction this summer.

The New Era Telephone Company sustained a loss of over $1,000 by the sleet storm the early part of the month in the vicinity of Richmond.

Action is to be taken by the city councils of Meenah and Menasha for the removal of all telephone and telegraph poles on Nicolet avenue, the dividing line between the two cities, which is soon to be boulevarded.

It has been officially announced that the Wisconsin Telephone Company has approved an estimate of $60,000 for the placing of wires of the company under ground in the business district of Kenosha. Engineers will at once start the work. According to an ordinance passed by the Kenosha council all wires must be underground not later than July 1.

A meeting of the board of directors of the Oconto Rural Telephone Company held at the office of the secretary resulted in the following officers' election: Samuel McDowell, president; O. P. Safford, vice-president; C. Hermsen, secretary and manager; W. M. Comstock, treasurer.

The sleet storm crippled communication between Milwaukee and places north of Appleton and Green Bay.

At the eleventh annual meeting of the Badger Telephone Company at Alderley, officers elected were: President, John Steele; first vice-president, J. J. Reid; second vice-president, S. W. Counsell; secretary-treasurer, and commercial manager, Henry E. Rosenow. The board of trustees are Henry Peterson, O. G. Halverson and David Mountin.

Damage aggregating about $200,000 was done by the storm to the telephone system in this part of the state. Approximately 500 poles were down between Green Bay and Oconto and around De Pere, in the district of Seymour and Shawano.

The Wisconsin Telephone Company welcomed many visitors to their enlarged exchange in Madison on February 18 and 19. The visitors were given an opportunity to inspect the apparatus and see the operating methods in vogue in the exchange.

WYOMING.

Articles of incorporation for the Lance Creek Telephone Company of Lusk, have been filed with secretary of state Frank L. Houx. The firm has a capital stock of $1500, of which $1,450 has been fully subscribed. The stated object of the company is to construct telephone lines and engage in the telephone business in Niobrara county with head offices in Lusk. Alfred Johnson, Albert Roshells and Andrew Anderson, all of Lusk, are the directors.